# 见识丛书套装

## 时间地图+太阳底下的新鲜事

（套装共2册）




中信出版集团

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# 时间地图

David Christian

# MAPS OF TIME

## An Introduction to Big History

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## 130亿年前至今

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[13] [illegible]

[14] [illegible]“[illegible]”[illegible]——[illegible]·[illegible]Jean-Franois Lyotard[illegible]·[illegible]Geoff Bennington[illegible]·[illegible]Brian Massumi[illegible]1984[illegible]xxiv[illegible]·[illegible]Keith Jenkins[illegible]“[illegible]”[illegible]1977[illegible]7[illegible]

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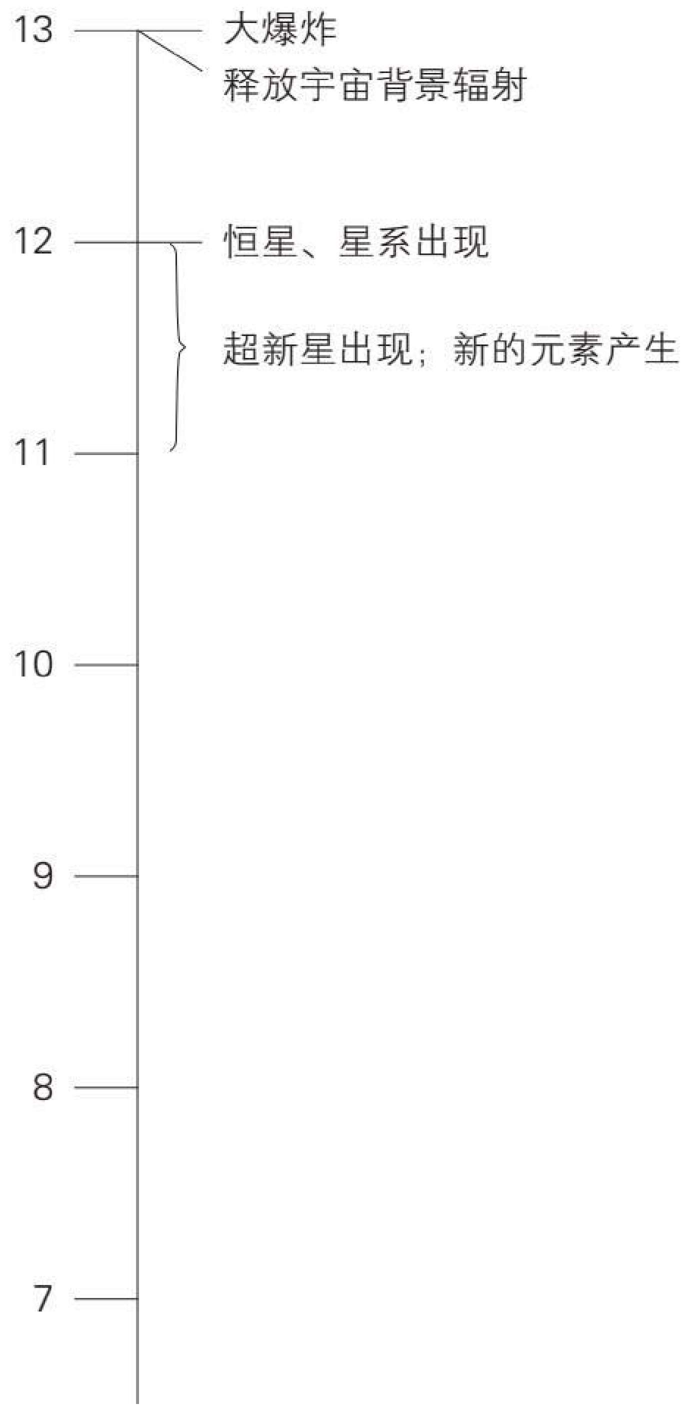
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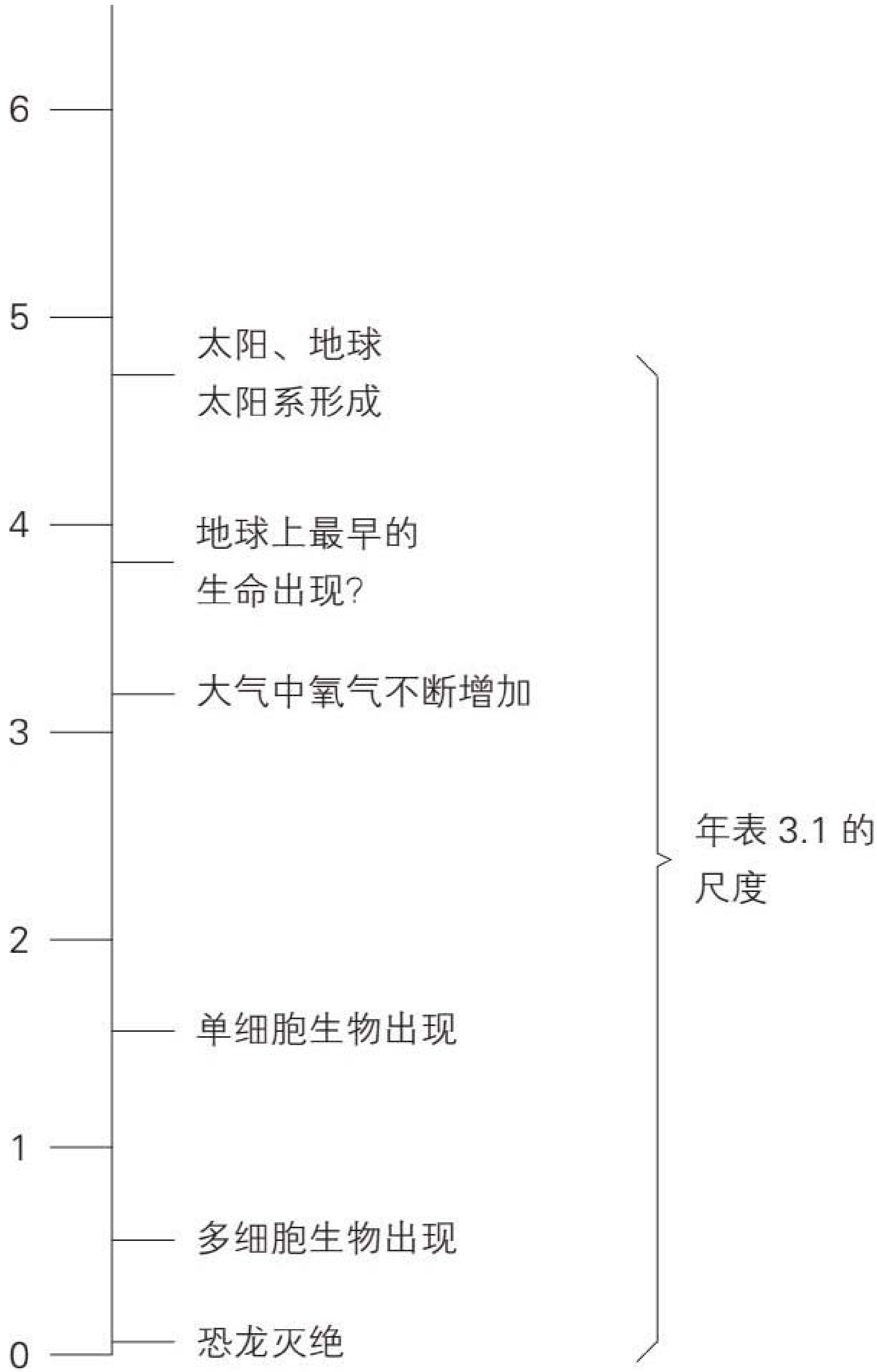
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大爆炸
释放宇宙背景辐射
12
恒星、星系出现
超新星出现；新的元素产生
11
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太阳、地球
太阳系形成
4
地球上最早的
生命出现?
大气中氧气不断增加
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年表 3.1 的
尺度
2
单细胞生物出现
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[illegible]subatomic particles[illegible]“[illegible]”[2]

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[illegible]16[illegible]·[illegible]*Popol Vuh*[illegible]“[illegible]Maker[illegible]Modeler[illegible] Sovereign Plumed Serpent [illegible] Bearers [illegible]Begetters[illegible]quetzal[illegible]”[4][illegible]

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[illegible]·[illegible]Lee Smolin[illegible]“[illegible]”[illegible]algorithmic[illegible]“[illegible]”[illegible]2[illegible][15][illegible]“[illegible]”[illegible]multiverse[illegible]

[illegible]Lightfoot[illegible]“[illegible]”[illegible]4004[illegible]10[illegible]23[illegible]9[illegible]00[illegible][16][illegible]——[illegible]

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[illegible]emergence myth[illegible]1927[illegible]“·[illegible]Georges Lemaoître[illegible]”[illegible]primordial atom[illegible]20[illegible]

[illegible][17][illegible]130[illegible][18][illegible]70[illegible]2[illegible]“[illegible]”[illegible]“[illegible]”[illegible]5[illegible]

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[illegible]·[illegible]Richard Feynman[illegible][20][illegible]——[illegible]“[illegible]/[illegible]”[illegible][21][illegible]$10^{-34}$[illegible]$10^{-32}$[illegible]30[illegible]“[illegible]”[illegible]antigravity[illegible]·[illegible]“[illegible]”[22]

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表1.1 [illegible]

| 距离大爆炸的时间 | 大事记 |
| --- | --- |
| $10^{-43}$ 秒 | “普朗克时间”；宇宙小于物理意义上的最小的长度单位“普朗克长度”；在此之前所发生的事情我们无法说明，但是作为基本力之一的引力已经出现了。 |
| $10^{-35}$ 秒 | “强”“电磁”力作为不同的基本力开始出现。 |
| $10^{-33}$—$10^{-32}$ 秒 | “膨胀”：宇宙以超光速的速度扩张，温度下降至接近绝对零度。 |
| 大约<br>$10^{-10}$—$10^{-6}$ 秒 | 当基本力彼此单独分离，宇宙温度再次升高；夸克和反夸克相互创造和消亡；继续存在的夸克局限于质子和中子（它们的总和只不过是原先夸克和反夸克总和的十亿分之一）。 |
| 1—10 秒 | 正负电子相互结对并且消亡（残留下来的也许只是原先正负电子总和的十亿分之一）。 |
| 3 分钟 | 质子和中子结合成氢和氦的原子核。 |
| 30 万年 | 带负电荷的原子被带正电荷的中子捕获；宇宙在电价上变为中性，而且放射线和物质彼此分离；在至今仍能察觉到的巨大“闪光”中，放射线以背景微波射线的形式被释放出来。 |

[illegible]·[illegible]Cesare Emiliani[illegible]2[illegible]·[illegible]1995[illegible], [illegible]82[illegible]·[illegible]2001[illegible]78[illegible]

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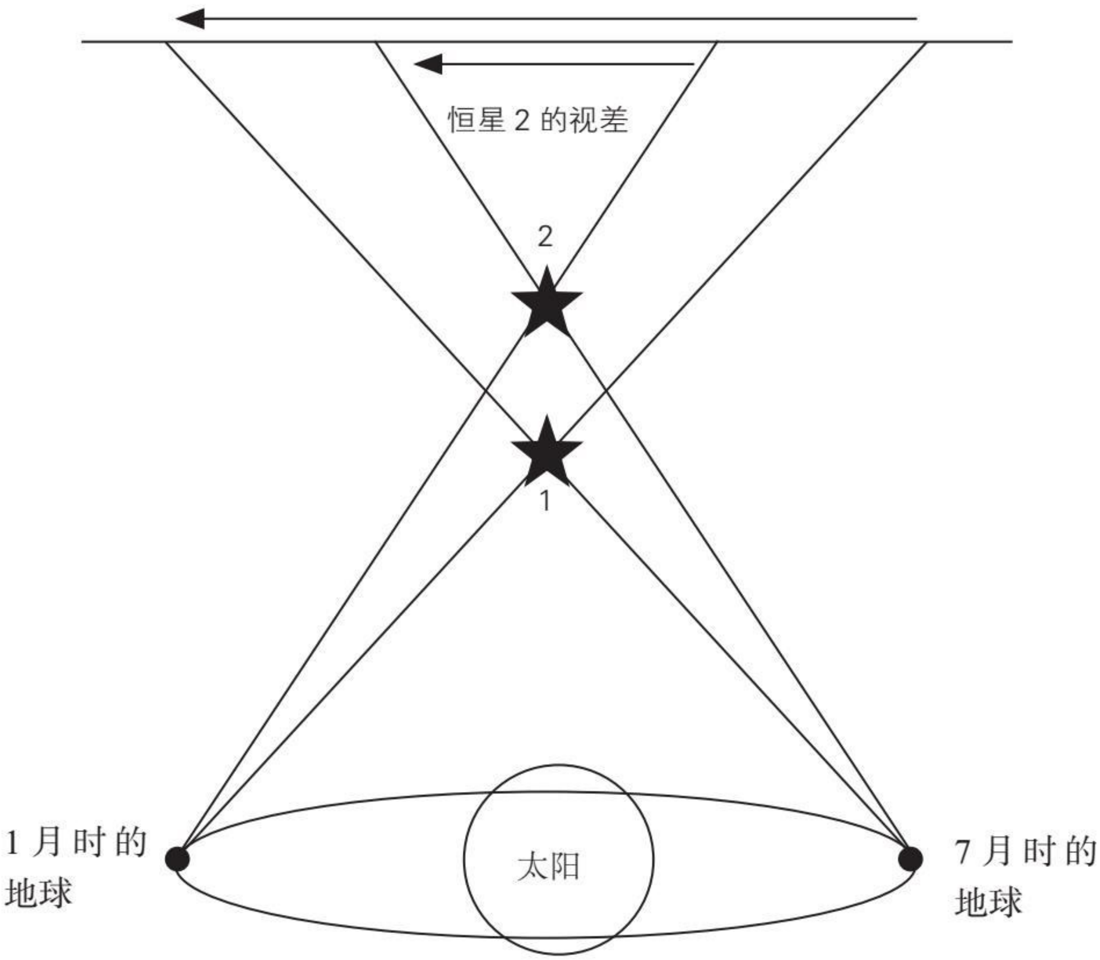
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[illegible]6[illegible]·[illegible]Ken Croswell[illegible]“[illegible]”[illegible]1999[illegible]——[illegible]1996[illegible]16[illegible]

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20[illegible]20[illegible]·[illegible]Edwin Hubble[illegible]·[illegible]1924[illegible]20[illegible]20[illegible]90%[illegible]

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[illegible]100[illegible]500[illegible]/[illegible]100[illegible]326[illegible]$30.9\times10^{18}$[illegible]3000[illegible]20[illegible]55—75[illegible]/[illegible]·[illegible]100[illegible]160[illegible]130[illegible][30][illegible]

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[illegible]

[illegible]（Cosmic Background Radiation，[illegible]CBR）[illegible]。

[illegible]·[illegible]（Arno Penzias）[illegible]·[illegible]（Robert Wilson）[illegible]1964[illegible]“[illegible]”[illegible]——[illegible]——[illegible]P. J. E.[illegible]（P. J. E. Peebles）[illegible]3℃[illegible]。

[illegible]1965[illegible]·[illegible]Max Tegmark[illegible]“[illegible]DNA[illegible]”[31][illegible] 2001[illegible]6[illegible]the Wilkinson Microwave Anisotropy Probe[illegible]WMAP[illegible][32]

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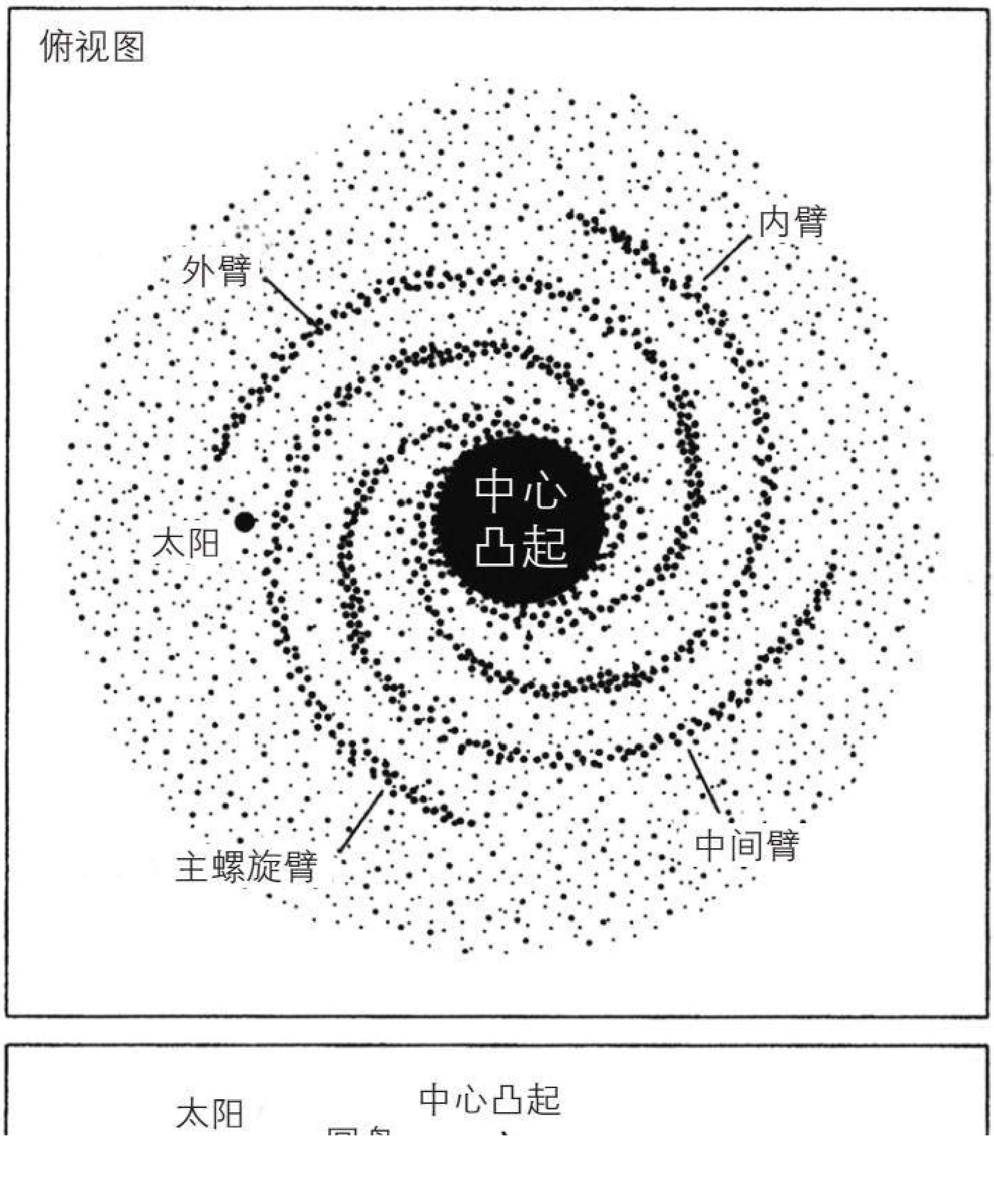
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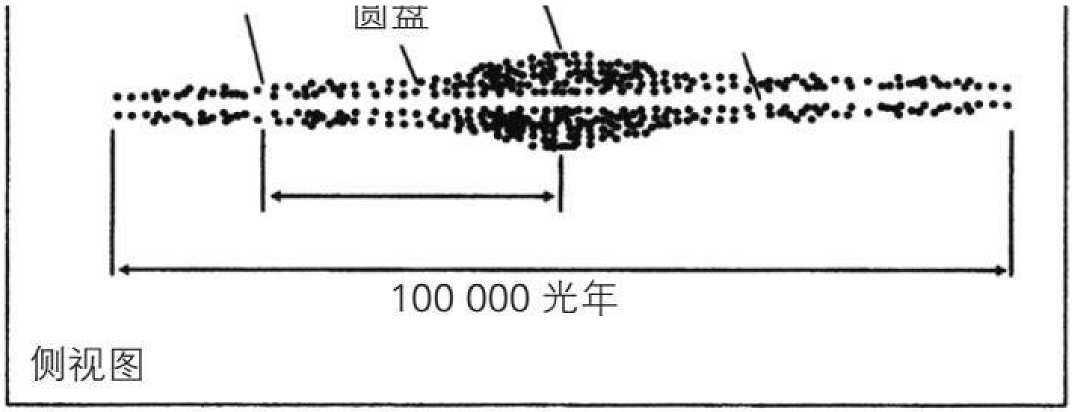
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[illegible]8[illegible]supernova[illegible]1000[illegible]30[illegible]neutron star[illegible]600[illegible]1967[illegible]pulsar[illegible]30[illegible]1054[illegible]

[illegible]30[illegible]1987[illegible]2[illegible]1604[illegible]1987[illegible]-69 202[illegible]Sanduleak-69 202[illegible]40[illegible]16[illegible]16[illegible]“[illegible]”[illegible][10]

[illegible]Ia[illegible]Ia supernova[illegible]

[illegible]6[illegible]26[illegible]

[illegible]200[illegible]

2.7 40%

98% 72% 27% 1.4% 0.5% 10 0.03% [11] 3

G2 95% [12] 140 4 46 40 —— 50 1/3 150 100 6000 100 subatomic particle 8 1.5

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[illegible]

[illegible]130[illegible]130[illegible]130[illegible]

[illegible]10[illegible]36[illegible]$10^{36}$[illegible][13][illegible]

[illegible]1000[illegible]1[illegible]1000[illegible]1000[illegible]1000[illegible]1000[illegible]1000[illegible][14][illegible]1000[illegible][15][illegible]100[illegible]

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[illegible]·[illegible]1996[illegible]·[illegible]1988[illegible]·[illegible]1998[illegible]·[illegible]1995[illegible]2[illegible]·[illegible]Isaac Asimov[illegible]·[illegible]1981[illegible]·[illegible]2000[illegible]·[illegible]1998[illegible]2001[illegible]·[illegible]·[illegible]2002[illegible]“[illegible]”[illegible]

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[1] [illegible]·[illegible]2000[illegible]126[illegible]

[2] [illegible]·[illegible]1997[illegible]151—152[illegible]

[3] [illegible]5[illegible]“[illegible]”[illegible]6[illegible]0.005%[illegible]0.3%[illegible]5%[illegible]“[illegible]”[illegible]25%[illegible]70%[illegible]“[illegible]”[illegible]·B. [illegible]David B. Cline[illegible]2003[illegible]3[illegible]50—59[illegible]53[illegible]

[4] [illegible]NASA[illegible]2003[illegible]2[illegible]WMAP[illegible]2[illegible]2003[illegible]2[illegible]12[illegible]

□http://imagine.gsfc.nasa.gov/docs/features/news/12febo3.html□2003□4□□□□□

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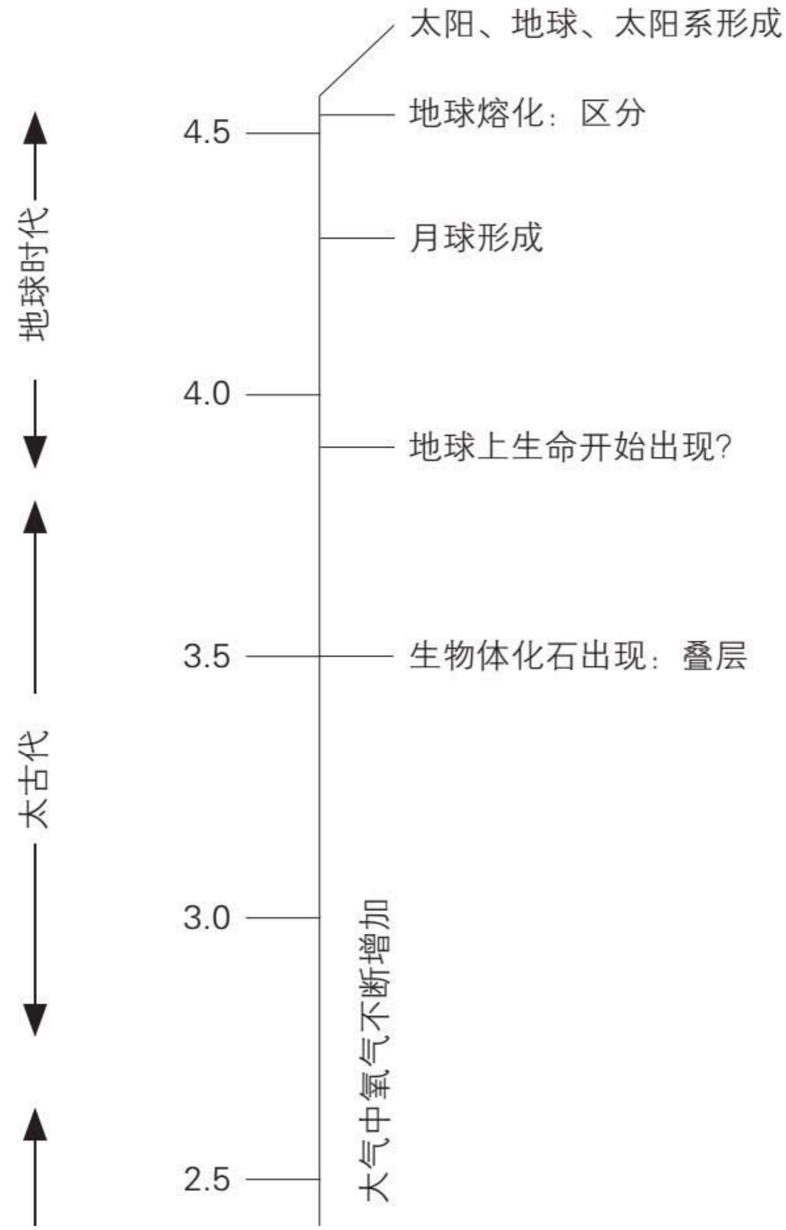
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[illegible]2[illegible]——[illegible]“[illegible]”——[illegible]“[illegible]”[illegible]

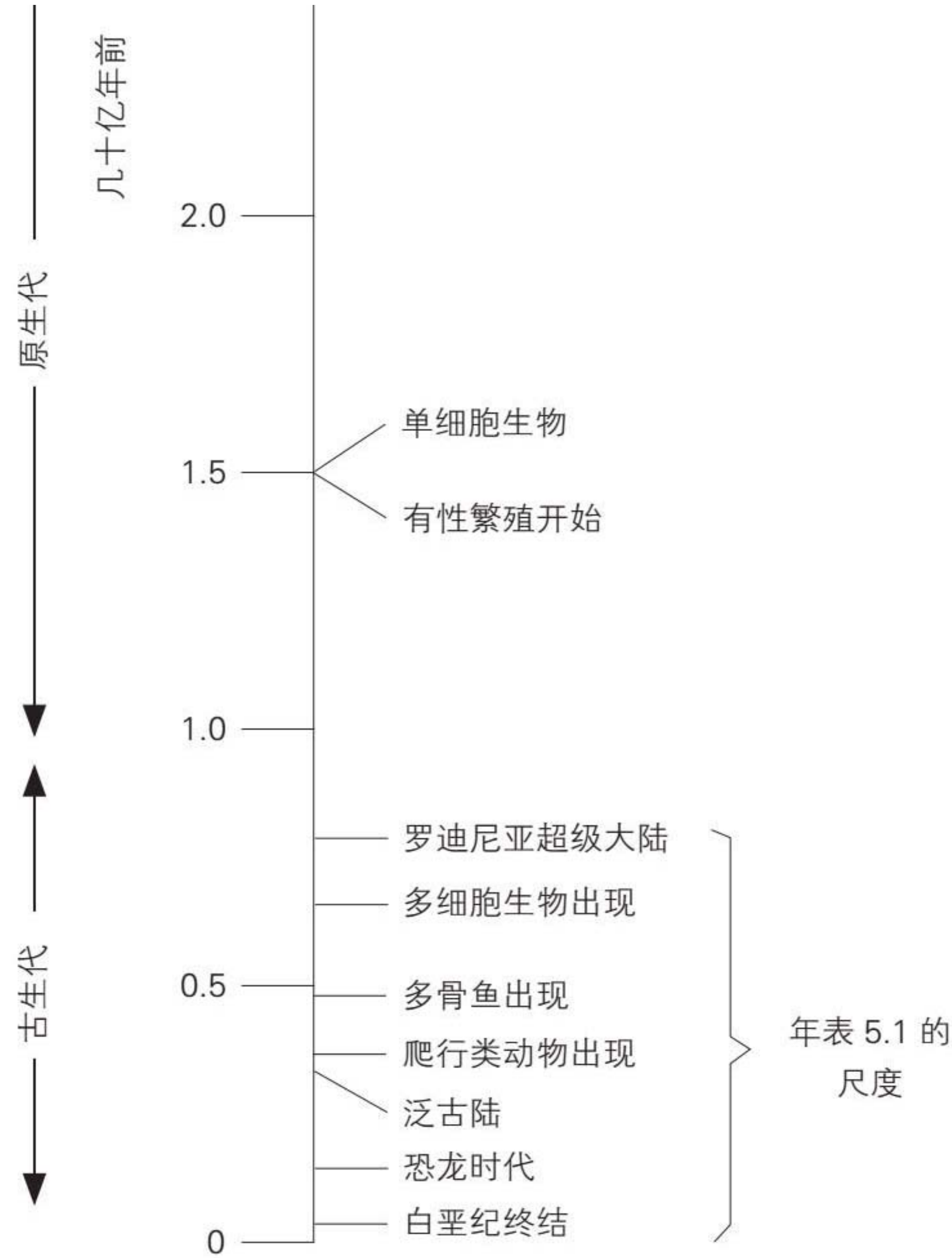
[illegible]20[illegible]60[illegible]

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[illegible]45.6[illegible]1/3[illegible]



太阳、地球、太阳系形成
4.5
地球熔化：区分
月球形成
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地球上生命开始出现?
3.5
生物体化石出现：叠层
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3.0
大气中氧气不断增加
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**[illegible]3.1 [illegible]“[illegible]”[illegible]45[illegible]**

[illegible]99.9%[illegible]0.1%[illegible]59[illegible]10[illegible]

[illegible]20[illegible]90[illegible]98%[illegible]

[illegible]300[illegible]1/1000[illegible]100[illegible]“[illegible]”[illegible]3[illegible]/[illegible]2[illegible]/[illegible]

[illegible]——[illegible]accretion[illegible]1755[illegible]10[illegible]10[illegible]Oort cloud[illegible]35[illegible]Chiron[illegible]200[illegible]

[illegible]10[illegible]T[illegible]T Tauri wind[illegible]T[illegible]100[illegible]30[illegible]

[illegible]

[illegible]50%[illegible]19%[illegible]14%[illegible]12.5%[illegible]“[illegible]”[illegible]5000[illegible][1][illegible]

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[illegible]1995[illegible]6[illegible]70[illegible]1998[illegible]5[illegible]——[illegible]3[illegible]——[illegible][2][illegible]10%[illegible]4[illegible]

## [illegible]

10 “ ” A1 10

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[illegible] $CO_2$ [illegible] 35 [illegible] 100℃ [illegible]

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[illegible] 10 [illegible] [4] [illegible] 5000 [illegible] 1 [illegible] “[illegible]” [illegible]

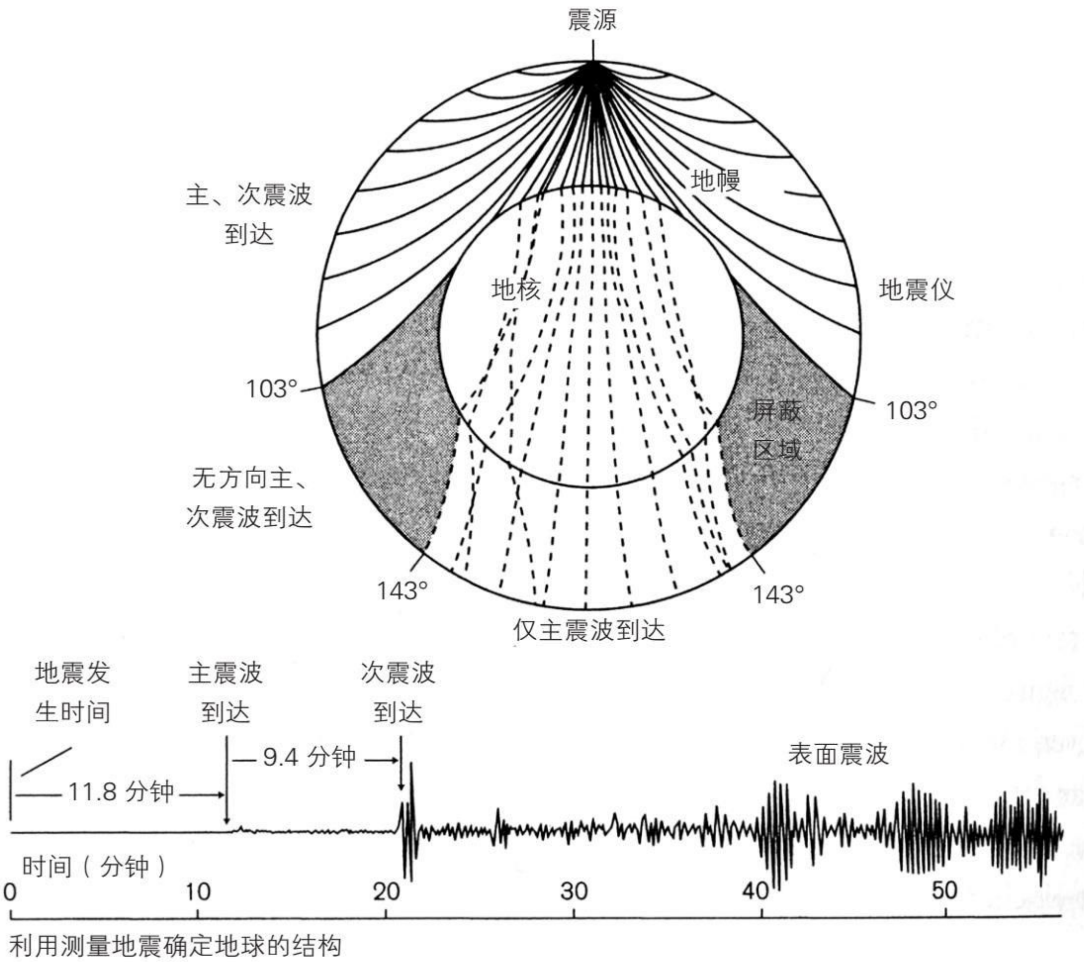
[illegible] 10 [illegible]

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[illegible]——[illegible]——[illegible]




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[illegible]6000[illegible]

[illegible]20[illegible]

[illegible]38[illegible]8[illegible]45.6[illegible]45.6[illegible]

## [illegible]

[illegible]

20[illegible]60[illegible]60[illegible]

[illegible]6000[illegible]17[illegible]·[illegible]Nicholas Steno[illegible]

[illegible]6000[illegible]19[illegible]

[illegible]18[illegible]19[illegible]·[illegible]Charles Lyell[illegible]uniformitarianism[illegible]volcanic activity[illegible]1830[illegible]

[illegible]19[illegible]2000[illegible]1[illegible]·[illegible]William Thompson[illegible]Lord Kelvin[illegible]20[illegible]

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[illegible]Wegener[illegible]1915[illegible]

[illegible]Gondwana sequence[illegible]“[illegible]”[illegible]

[illegible]1928[illegible]40[illegible]

——[illegible]

[illegible]

[illegible]2[illegible]——[illegible]40[illegible]

20[illegible]60[illegible]·[illegible]Harry Hess[illegible]

[illegible]spreading margin[illegible]

[illegible]3[illegible]1.5[illegible]

[illegible]subduction margin[illegible]

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[illegible]100—200[illegible]asthenosphere[illegible]46[illegible]

[illegible]GPS[illegible]

# [illegible]

[illegible]

[illegible]45.6[illegible]6[illegible][6][illegible]

[illegible]38[illegible]

[illegible]30[illegible]5[illegible]

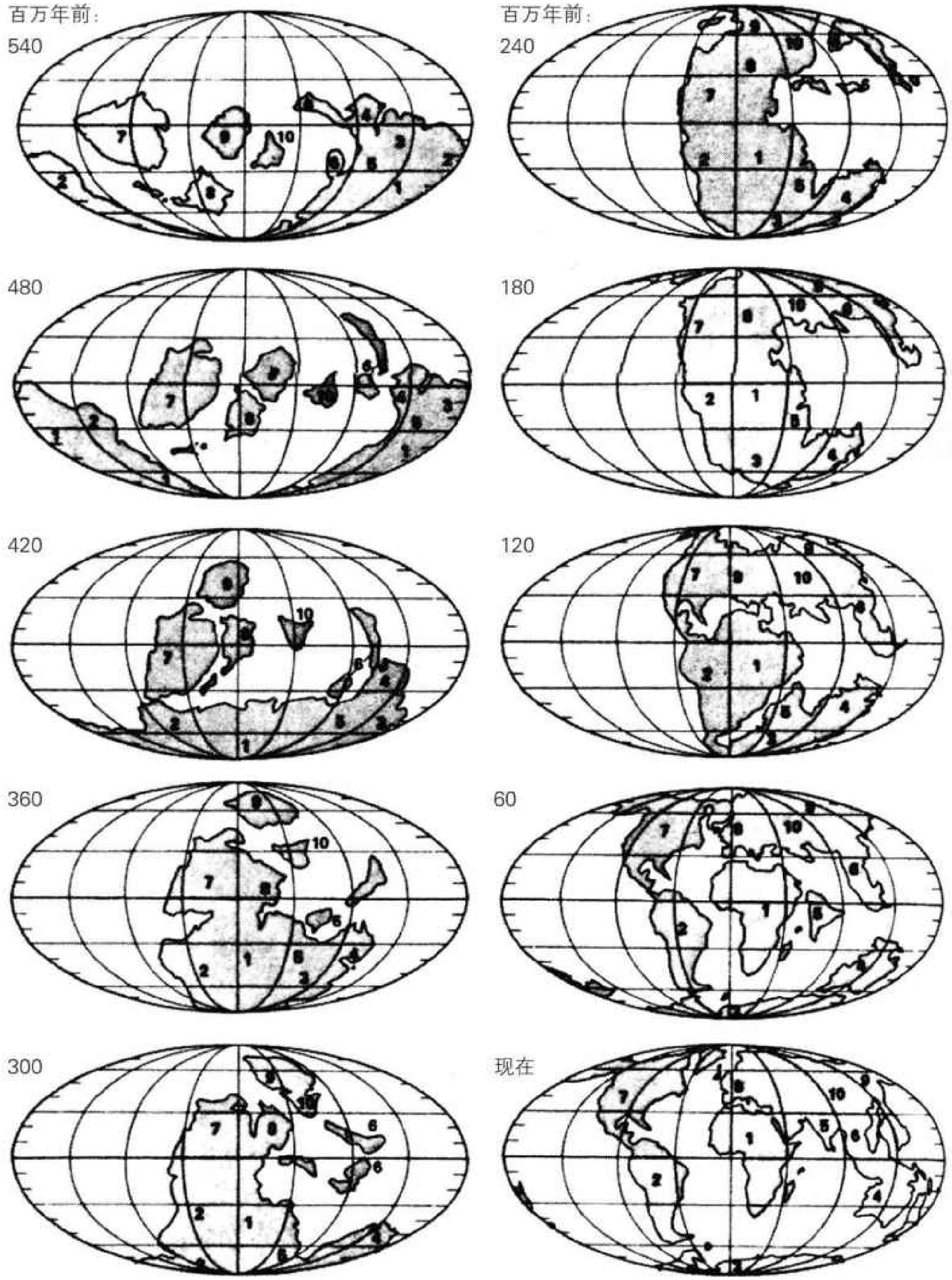
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[illegible]2.5[illegible]“[illegible]”[illegible]“[illegible]”[illegible]2[illegible]Laurasia[illegible]Gondwanaland[illegible]5[illegible]Rodinia[illegible][7][illegible]3.1[illegible]

[illegible]5[illegible]

## [illegible]

[illegible]45.6[illegible]




**[illegible]3.1 [illegible]5.4[illegible]**

[illegible]·[illegible]2[illegible]·[illegible]1995[illegible]82[illegible]1987[illegible]48[illegible]

[illegible]40[illegible]

[illegible]20[illegible]60[illegible]

## [illegible]

[illegible]·[illegible]Peter Cattermole[illegible]·[illegible]Patrick Moore[illegible]1986[illegible]J. D.[illegible]J. D. Macdougall[illegible]1996[illegible]·[illegible]Preston Cloud[illegible]1978[illegible]1988[illegible]·[illegible]1998[illegible]·[illegible]1995[illegible]2[illegible]·[illegible]Steven Stanley[illegible]1986[illegible]·[illegible]James Lovelock[illegible]Gaia hypothesis[illegible]·[illegible]Isaac Asimov[illegible]·[illegible]Ross Taylor[illegible]2000[illegible]

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[1] [illegible]·[illegible]Ross Taylor[illegible]·[illegible]2002[illegible]59—60[illegible]

[2] [illegible]·[illegible]Nigel Hawkes[illegible]1985[illegible]5[illegible]29[illegible]5[illegible]

[3] [illegible]·[illegible]Ian Crawford[illegible]2000[illegible]7[illegible]38—43[illegible]

[4] [illegible]·[illegible]1998[illegible]116—121[illegible]

[5] [illegible]285[illegible]·[illegible]Neil Roberts[illegible]2[illegible]1998[illegible]2[illegible]·[illegible]

[illegible]1983[illegible]

[6] [illegible]·[illegible]·[illegible]1995[illegible]64—80[illegible]

[7] [illegible]·[illegible]Ian W. D. Dalziel[illegible]1995[illegible]1[illegible]38—43[illegible]

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# [illegible]4[illegible]
# [illegible]

## [illegible]

“[illegible]”1943[illegible]·[illegible]Erwin Schrödinger[illegible]——[illegible]“[illegible]”[1]

[illegible]·[illegible][2][illegible]4.1[illegible]“[illegible]”[illegible][3][illegible]

[illegible]·[illegible]“[illegible]”[4][illegible]

[illegible]4.1 [illegible]

| 一般结构 | 自由能率密度<br>尔格　秒$^{-1}$　克$^{-1}$（erg $s^{-1}$ $g^{-1}$） |
| --- | --- |
| 星系（例如银河系） | 1 |
| 恒星（例如太阳） | 2 |
| 行星（例如地球） | 75 |
| 植物（生物圈） | 900 |
| 动物（例如人类的身体） | 20 000 |
| 大脑（例如人类的头盖骨） | 150 000 |
| 社会（例如现代人类文化） | 500 000 |

[illegible]·[illegible]2001[illegible]139[illegible]

[illegible]6[illegible]

[illegible]——[illegible]3℃[illegible]

[illegible]electromagnetism[illegible]the nuclear forces[illegible]

[illegible]“[illegible]”[illegible]

[illegible]——[illegible]·[illegible]Charles Darwin[illegible]

## [illegible]

[illegible]

[illegible]“[illegible]”[illegible]natural selection[illegible]“[illegible]”[illegible]evolution[illegible]·[illegible]1859[illegible][5][illegible]·[illegible]Herbert Spencer[illegible]“[illegible]”[illegible]life-form[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

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[illegible]habitat[illegible]niche[illegible]niche[illegible]“[illegible]”[illegible]niche[illegible]——[illegible]“[illegible]”[illegible]

[illegible]

# [illegible]

[illegible]17[illegible]18[illegible]——[illegible]6000[illegible]18[illegible]taxonomy[illegible]·[illegible]Carl Linnaeus[illegible]17[illegible]18[illegible]

[illegible]

[illegible]English carrier[illegible]short faced tumbler[illegible]

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runt[illegible]
[illegible]……[illegible]pouter[illegible]
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[illegible]——[illegible]

[illegible]18[illegible]

19[illegible]·[illegible]Erasmus Darwin[illegible]1809[illegible]——[illegible]·[illegible]JeanBaptiste Lamarck[illegible]——[illegible]——[illegible]

[illegible]20[illegible]

[illegible]

1831[illegible]“[illegible]”[illegible]Beagle[illegible]

[illegible]·[illegible]“[illegible]”[illegible]1838[illegible]·[illegible]Thomas Malthus[illegible]

> [illegible]·[illegible]Sir John Selbright[illegible]“[illegible]”[illegible]Saxony[illegible]merino sheep[illegible][7]

[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]fitness[illegible]

artificial selection

[8]

[illegible]……[illegible]“[illegible]”。[9]

## [illegible]

[illegible]。

[illegible]“[illegible]”[illegible]1.5[illegible]1862[illegible]。

[illegible]。

[illegible]

[illegible]6[illegible]·[illegible]Yves Coppens[illegible]“[illegible]”[10][illegible]1[illegible]1[illegible]19[illegible]“[illegible]”[illegible]——[illegible]——[illegible]

[illegible]20[illegible]

[illegible]20[illegible]

[illegible]1[illegible]40[illegible]40[illegible]20[illegible]

[illegible]·[illegible]Gregor Mendel[illegible]20[illegible]——[illegible]DNA[illegible]50[illegible][11][illegible]·[illegible]Francis Crick[illegible]·[illegible]James Watson[illegible]1953[illegible]

[illegible]

[illegible]97%[illegible]“[illegible]”[illegible]

[illegible]

[illegible]“[illegible]”[illegible]punctuated evolution[illegible]·[illegible]Niles Eldridge[illegible]·[illegible]·[illegible]Stephen Jay Gould[illegible]1972[illegible]

## [illegible]

[illegible][12][illegible]17[illegible]“[illegible]”[illegible]

[illegible]·[illegible]Louis Pasteur[illegible]——[illegible]19[illegible]1862[illegible]spore[illegible]

[illegible]Cambrian Era[illegible]6[illegible]19[illegible]

[illegible]19[illegible]

[illegible]20[illegible]·[illegible]Alexander Oparin[illegible]·[illegible]·[illegible]John Burdon Haldane[illegible]20[illegible]20[illegible]“[illegible]”[illegible]

[illegible]DNA[illegible]

[illegible]99%[illegible][13][illegible][14][illegible]

[illegible]1952[illegible]·[illegible]Harold Urey[illegible]·[illegible]Stanley Miller[illegible]

[illegible]7[illegible]20[illegible]20—40[illegible]20[illegible]“[illegible]——[illegible]”[illegible]

[illegible]“[illegible]——[illegible]”[illegible]

[illegible]phospholipid[illegible]——[illegible]——[illegible]1996[illegible]1.3[illegible][15][illegible]

[illegible]100[illegible]1[illegible]——100[illegible]$10^{12}$——$10^{14}$[illegible]

[illegible]

[illegible]·[illegible]Fred Hoyle[illegible]·[illegible]Chandra Wickramasinghe[illegible]Panspermia[illegible]

[illegible]——[illegible]——[illegible]Biogenesis[illegible]1871[illegible]“[illegible]”[illegible][16][illegible]

[illegible]A. G.[illegible]——[illegible]A. G. Cairns-Smith[illegible][17][illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible][18][illegible]

[illegible]40[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]——[illegible]38[illegible]——[illegible]archaebacteria[illegible][19][illegible]prokaryote[illegible]“[illegible]”[illegible]20[illegible]90[illegible]1000[illegible]2001[illegible]“[illegible]”[illegible]olivine[illegible][20][illegible]

[illegible]“[illegible]——[illegible]”[illegible]

[illegible][21]

[illegible]——[illegible][22]

[illegible]“[illegible]”[illegible]·[illegible]10[illegible][23][illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible][24][illegible]autocatalysis[illegible]runaway reaction[illegible]

[illegible] 2 [illegible]

[illegible] A [illegible] T [illegible] cytosine [illegible] C [illegible] guanine [illegible] G [illegible] A [illegible] T [illegible] C [illegible] G [illegible]

[illegible] “[illegible]” [illegible] —— [illegible]

20 [illegible] 60 [illegible] RNA [illegible] “[illegible]

[illegible]”[illegible]

[illegible]·[illegible]Manfred Eigen[illegible]·[illegible]Leslie Orgel[illegible][25][illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible][26]

[illegible]·[illegible][27][illegible]ATP[illegible]“[illegible]”[illegible]

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[illegible]nucleic acids[illegible]cell nuclei[illegible]

[15] [illegible]·[illegible]Malcolm Walter[illegible]1999[illegible]

[16] [illegible]·[illegible]1999[illegible]54[illegible]

[17] A. G. [illegible]——[illegible]1985[illegible]

[18] [illegible]·[illegible]92[illegible]

[19] [illegible]7[illegible]

[20] [illegible]·L.[illegible]·[illegible]Karen L. Von Damm[illegible]2001[illegible]7[illegible]12[illegible]127—128[illegible]

[21] [illegible]·[illegible]Birger Rasmussen[illegible]32.35[illegible]2000[illegible]6[illegible]8[illegible]676—679[illegible]“[illegible]”[illegible]extremophile[illegible]32[illegible]Pilbara[illegible]“[illegible]”[illegible]5[illegible]

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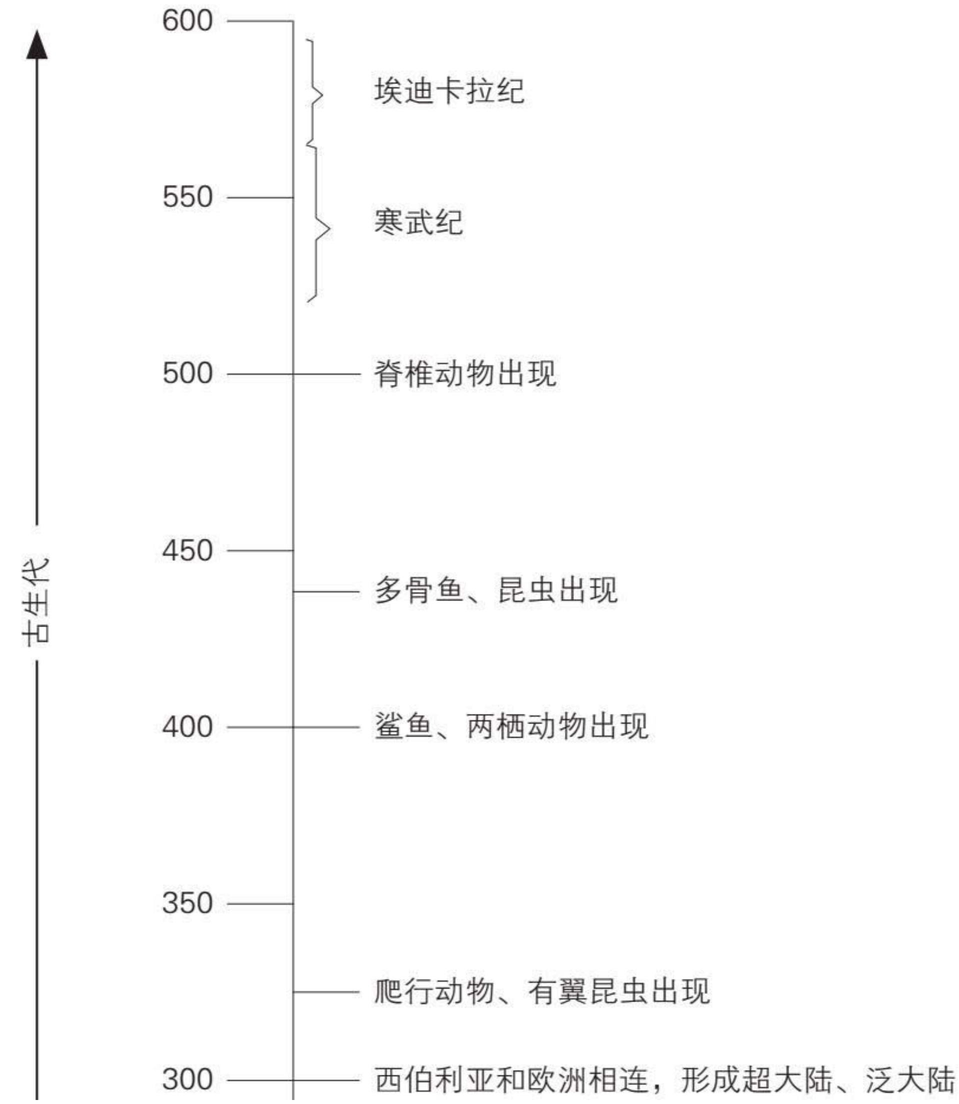
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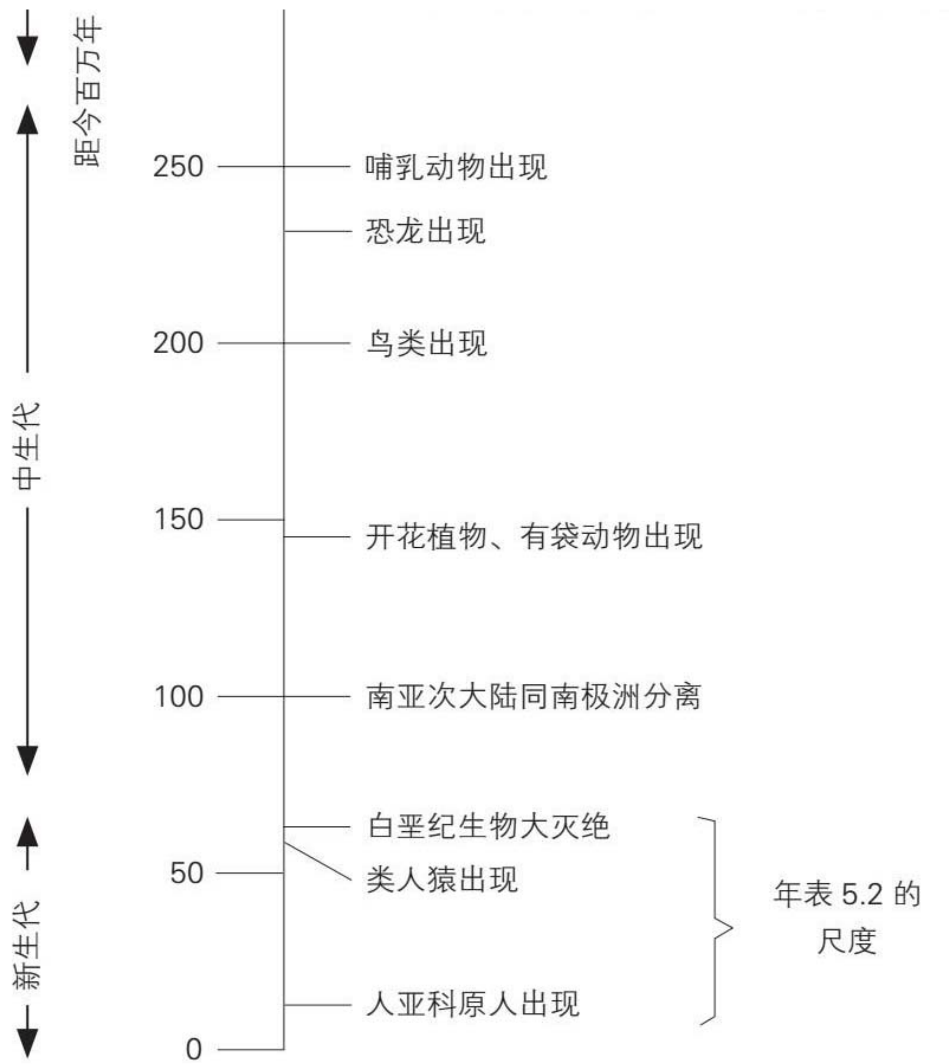
[25] [illegible]·[illegible]·[illegible]·[illegible]Eörs Szathmáry[illegible]1999[illegible]3[illegible]4[illegible]“[illegible]”[illegible]

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[27] [illegible]3[illegible]



古生代
600
埃迪卡拉纪
550
寒武纪
500
脊椎动物出现
450
多骨鱼、昆虫出现
400
鲨鱼、两栖动物出现
350
爬行动物、有翼昆虫出现
300
西伯利亚和欧洲相连，形成超大陆、泛大陆


距今百万年
中生代
新生代
250
200
150
100
50
0
哺乳动物出现
恐龙出现
鸟类出现
开花植物、有袋动物出现
南亚次大陆同南极洲分离
白垩纪生物大灭绝
类人猿出现
人亚科原人出现
年表 5.2 的
尺度

**[illegible]5.1 [illegible]6[illegible]**

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[illegible]40[illegible]·[illegible]·[illegible]Dorion Sagan[illegible]“[illegible]”[illegible][1][illegible]·[illegible]·[illegible][2][illegible]40[illegible]·[illegible]·[illegible]John Maynard Smith[illegible]·[illegible]“[illegible]……[illegible]”[3]“[illegible]”[illegible]——[illegible]

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[illegible]——[illegible]——[illegible]——[illegible]

[illegible]6[illegible]8[illegible]3[illegible]2/3[illegible]1.9[illegible]1.3[illegible]4000[illegible]

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[illegible]40[illegible]40[illegible]25[illegible]——20[illegible][5]

[illegible]38[illegible]C12[illegible]35[illegible][6][illegible]·[illegible]“[illegible]”[illegible][7]

[illegible]“[illegible]”[illegible]——[illegible]

[illegible]“[illegible]”[illegible]35[illegible]

[illegible][8][illegible]——[illegible]3[illegible]

[illegible]

[illegible]

[illegible]30[illegible]

[illegible]

[illegible][9]

[illegible]——[illegible]——[illegible]“[illegible]”[illegible][10][illegible]

[illegible]“[illegible]”[11][illegible]

[illegible]

# [illegible]

[illegible]——[illegible]——[illegible]

[illegible]25[illegible]20[illegible]3%[illegible]10[illegible]21%[illegible][12][illegible]

[illegible]“[illegible]”[illegible][13][illegible]·[illegible]James Lovelock[illegible]“[illegible]20[illegible]”[14]

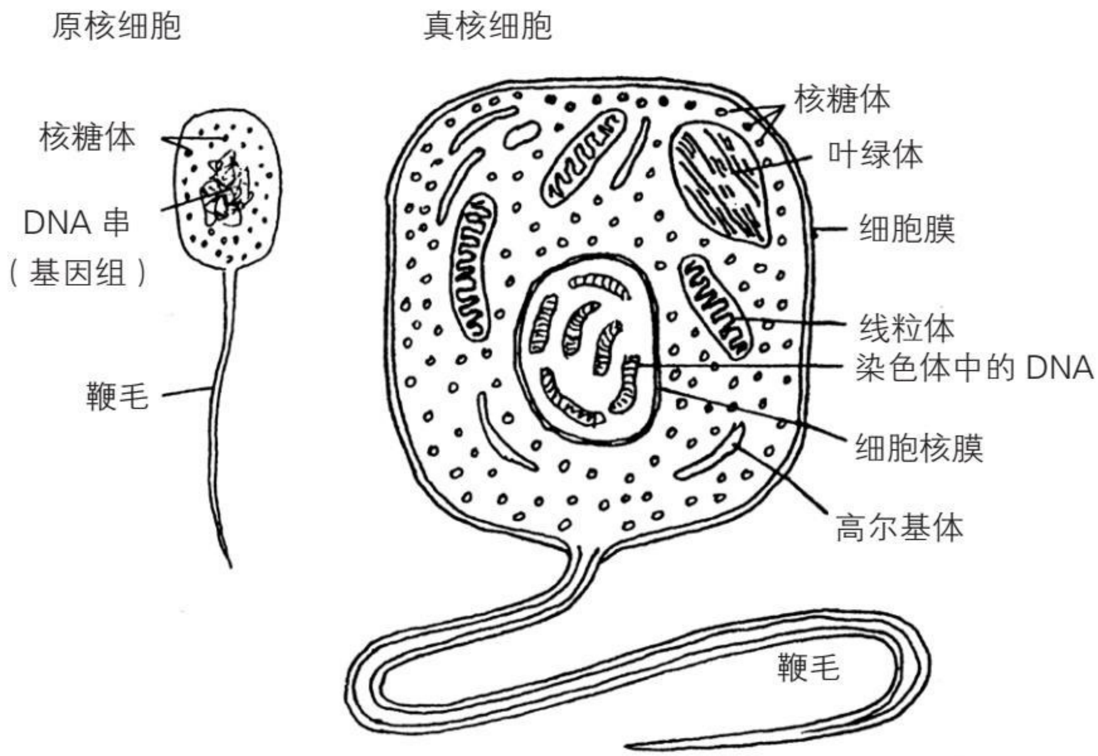
[illegible]20[illegible]“[illegible]”[illegible]“[illegible]”[illegible][15][illegible]“[illegible]”[16]

[illegible]20[illegible]“[illegible]”[illegible]30[illegible]O3[illegible]17[illegible][17][illegible][18][illegible]0.001[illegible]——0.01[illegible]0.01[illegible]——0.1[illegible]1000[illegible]·[illegible]Chet Raymo[illegible]“[illegible]”[19][illegible]5.1[illegible]

[illegible]——[illegible]——[illegible]

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[illegible]·[illegible]——[illegible]——[illegible]parasitism[illegible]commensalism[illegible]mutualism[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]




**5.1**

· 1998 164

“ ” “ ”[20] —— “ ” ——

[illegible]“[illegible]”[21][illegible]12[illegible]

[illegible]10[illegible][22]

## [illegible]

[illegible]

[illegible]“[illegible]”——[illegible]6[illegible]

[illegible]20[illegible][23][illegible]10[illegible]

[illegible]

[illegible]

[illegible] 1000[illegible]“[illegible]”[illegible]——[illegible][24]

[illegible]

[illegible]50%[illegible][25][illegible]

[illegible]“[illegible]”[illegible]

[illegible][26][illegible]——[illegible]——[illegible]

[illegible]5.9[illegible]5.7[illegible]

[illegible]1000[illegible]——[illegible]250[illegible]3[illegible]60[illegible]30[illegible]60[illegible][27][illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]6[illegible]

[illegible]——[illegible]“[illegible]”[illegible][28][illegible]

[illegible]Linnaeus[illegible]——[illegible]

[illegible]19[illegible]·[illegible]（Ernst Haeckel[illegible]——[illegible]20[illegible]30[illegible]20[illegible]20[illegible]90[illegible]·[illegible]Carl Woese[illegible]

[illegible]5.1 [illegible]

| 总界 | 界 | 成员 |
|---|---|---|
| 原核生物总界（没有核子的单细胞生物体） | 原核生物界 | 细菌，蓝藻，原始细菌（有时被列入一个独立的界） |
| 真核生物总界（有核子和细胞器官） | 原生生物界（多数为单细胞生物） | 原生植物，原生动物粘（真）菌 |
| | 植物界（多细胞生物，包含叶绿素，能进行光合作用，通常不能移动） | 藻类，苔藓类植物（苔、叶苔和金鱼藻），蕨类植物，裸蕨植物，石松类，柏类，松类，银杏类，苏铁类，开花植物 |
| | 真菌界（多细胞生物，不含叶绿素，通过分解有机的残留物获得能量，通常不能移动） | 酵母，毒蕈和蘑菇 |
| | 动物界（多细胞生物，不含叶绿素，从其他生物体处获得能量，通常可移动） | 原生动物，海绵体，珊瑚虫，扁形虫，绦虫，节肢动物，软体动物，腕足动物，环节动物，苔藓虫，棘皮类动物，半索海生动物和脊索动物，包括脊椎动物 |

[illegible]5.1[illegible]

[illegible][29]

[illegible]5.9[illegible]5.7[illegible]Burgess shale[illegible]5.2[illegible]·[illegible]·[illegible][30][illegible]

[illegible]5.1[illegible]——4.4[illegible]“[illegible]”[illegible][31][illegible]4.1[illegible]——3.6[illegible]“[illegible]”[illegible]

[illegible]——[illegible][32][illegible]4.4[illegible]——4.1[illegible]5.1[illegible]4.4[illegible]

[illegible]

[illegible]·[illegible]Nicholas Humphrey[illegible]“[illegible]”[illegible]“[illegible]”[33][illegible]·[illegible]Terrence Deacon[illegible]sentience[illegible]consciousness[illegible]“[illegible]”[34][illegible]——[illegible][35][illegible]“[illegible]”[illegible]

[illegible]——[illegible]——[illegible]3.2[illegible]3.6[illegible]——2.9[illegible]“[illegible]”[illegible]“[illegible]”[illegible]2.5[illegible][36][illegible]2.5[illegible]——2.1[illegible]6500[illegible][37]

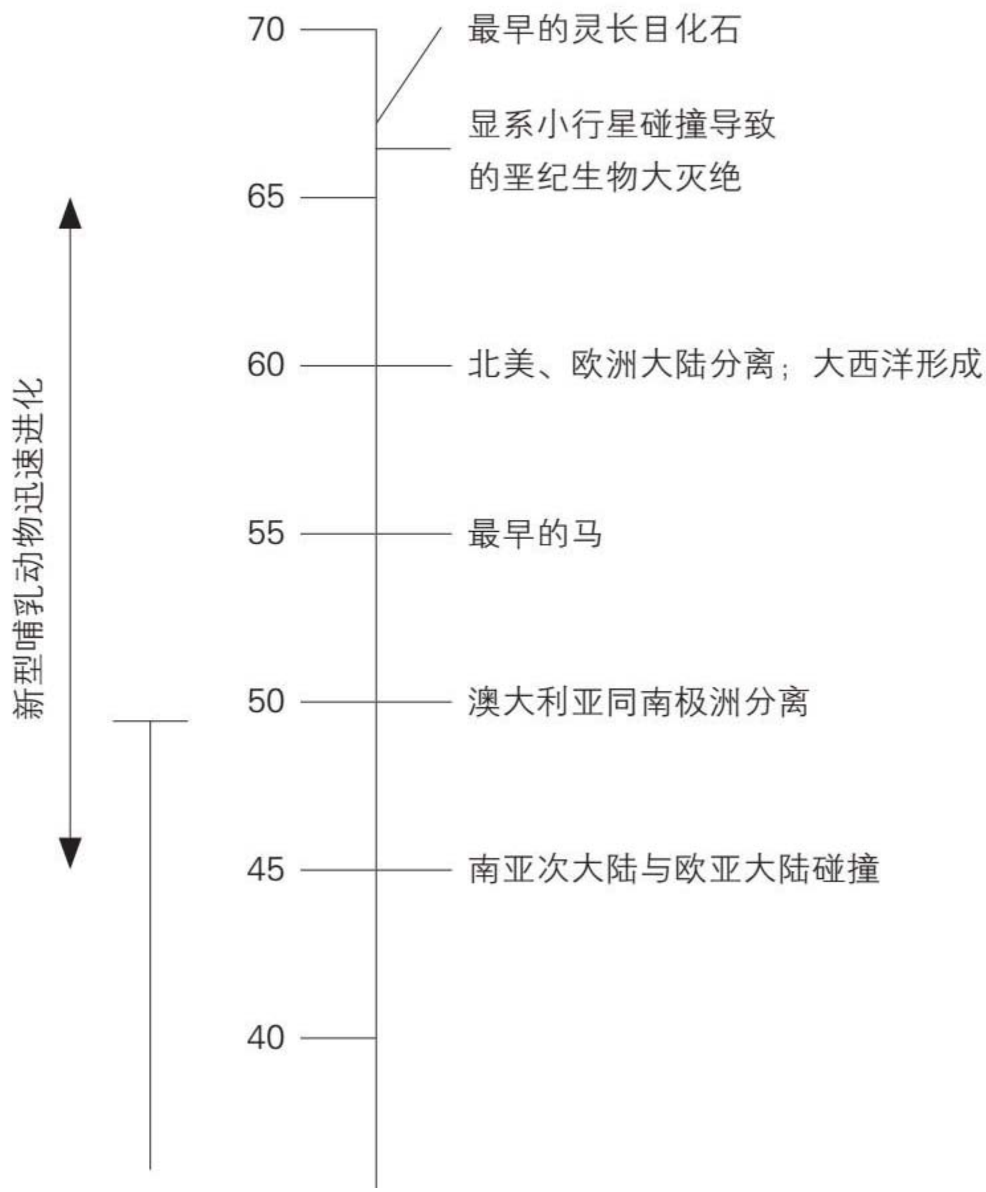
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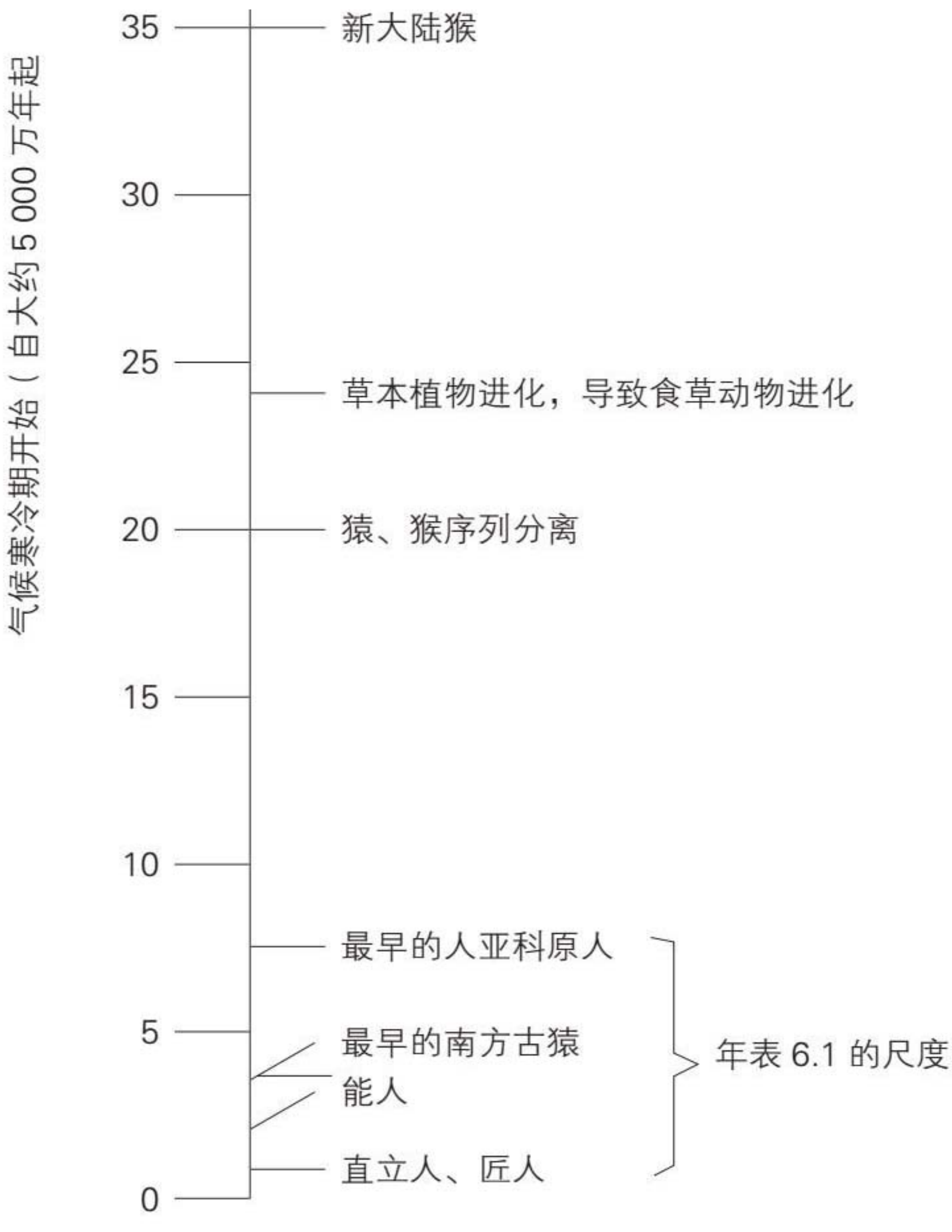
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[illegible] [39] [illegible]


70
最早的灵长目化石
显系小行星碰撞导致
的垩纪生物大灭绝
65
60
北美、欧洲大陆分离；大西洋形成
55
最早的马
50
澳大利亚同南极洲分离
45
南亚次大陆与欧亚大陆碰撞
40
新型哺乳动物迅速进化


气候寒冷期开始（自大约5 000万年起
35
30
25
20
15
10
5
0
新大陆猴
草本植物进化，导致食草动物进化
猿、猴序列分离
最早的人亚科原人
最早的南方古猿
能人
直立人、匠人
年表 6.1 的尺度

**[illegible]5.2 [illegible]7000[illegible]**

[illegible]200[illegible]

[illegible]Hominoidea, hominoids[illegible]2500[illegible]Alvares[illegible]17[illegible]“[illegible]dari[illegible]Amienu[illegible]”[40]

[illegible]Hominoidea[illegible]Hominidae[illegible]Pongidae[illegible]Hylobatidae[illegible]Gorillinae[illegible]Homininae[illegible]500[illegible]700[illegible]6[illegible]

## [illegible]“[illegible]”

[illegible]

[illegible]·[illegible]James Lovelock[illegible]

[illegible]“[illegible]”——[illegible]

[illegible]20[illegible]70[illegible][41]

[illegible]46[illegible]40%[illegible]15℃[illegible]DMS[illegible][42]

[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]

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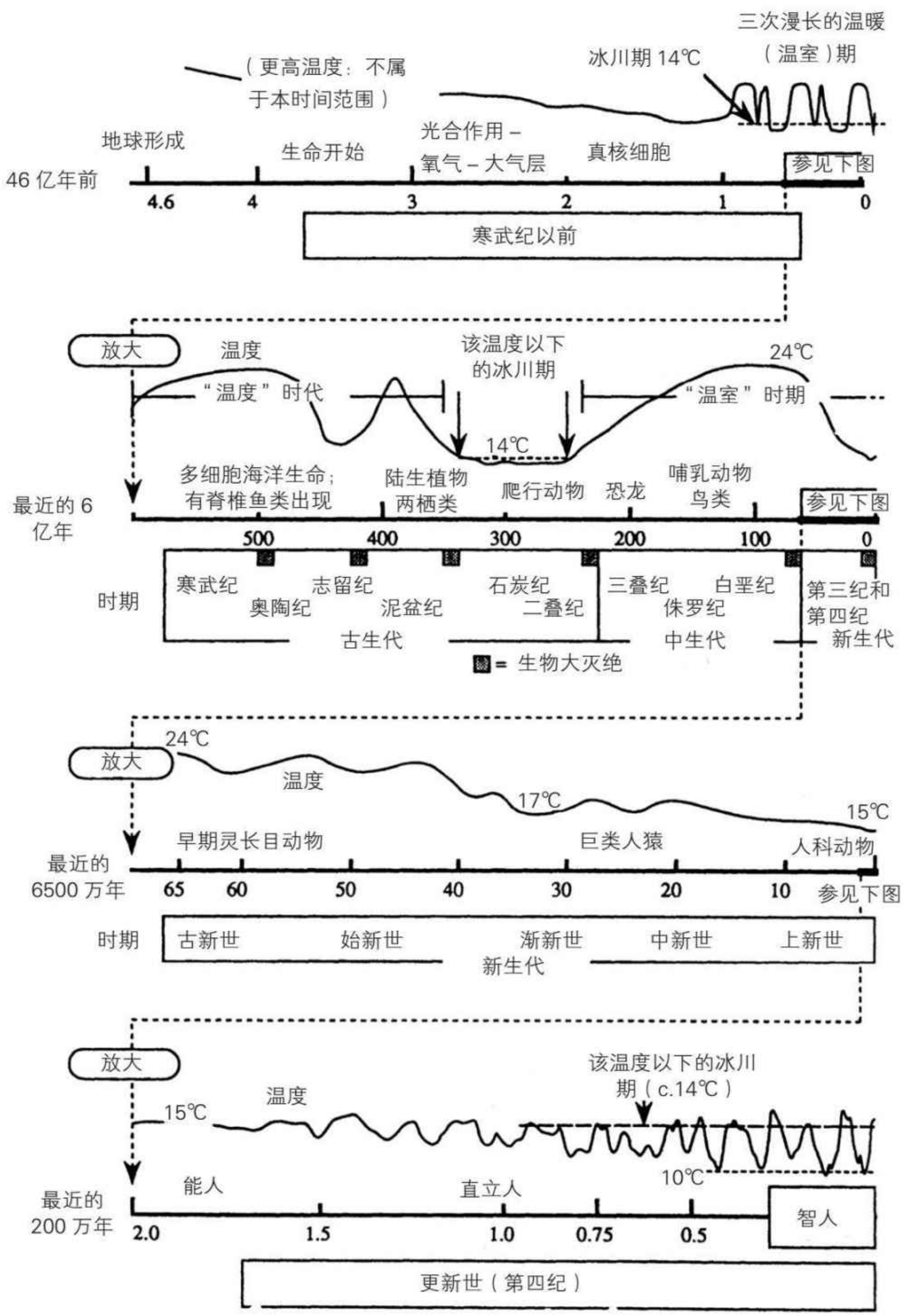
[illegible]——[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]5[illegible]——[illegible]75%[illegible]2.5[illegible]95%[illegible][45][illegible]

[illegible]2300[illegible]520[illegible]

[illegible]520[illegible]160[illegible]600[illegible]6%[illegible]350[illegible]250[illegible]90[illegible]“[illegible]”[illegible]5.2[illegible][46]

[illegible]500[illegible]280[illegible]4[illegible]100[illegible]7[illegible]100[illegible]1[illegible][47][illegible]1[illegible]10[illegible]1[illegible]1[illegible]



三次漫长的温暖（温室）期
冰川期 14℃
（更高温度：不属于本时间范围）
地球形成
生命开始
光合作用－氧气－大气层
真核细胞
参见下图
46 亿年前
4.6
4
3
2
1
0
寒武纪以前
放大
温度
该温度以下的冰川期
24℃
“温度”时代
“温室”时期
14℃
多细胞海洋生命；有脊椎鱼类出现
陆生植物 两栖类
爬行动物
恐龙
哺乳动物 鸟类
参见下图
最近的 6 亿年
500
400
300
200
100
0
时期
寒武纪
奥陶纪
志留纪
泥盆纪
石炭纪
二叠纪
三叠纪
侏罗纪
白垩纪
第三纪和第四纪
古生代
中生代
新生代
= 生物大灭绝
放大
24℃
温度
17℃
15℃
早期灵长目动物
巨类人猿
人科动物
最近的 6500 万年
65
60
50
40
30
20
10
参见下图
时期
古新世
始新世
渐新世
中新世
上新世
新生代
放大
温度
该温度以下的冰川期（c.14℃）
15℃
10℃
能人
直立人
智人
最近的 200 万年
2.0
1.5
1.0
0.75
0.5
更新世（第四纪）

**[illegible]5.2 [illegible]**

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[illegible]

## [illegible]

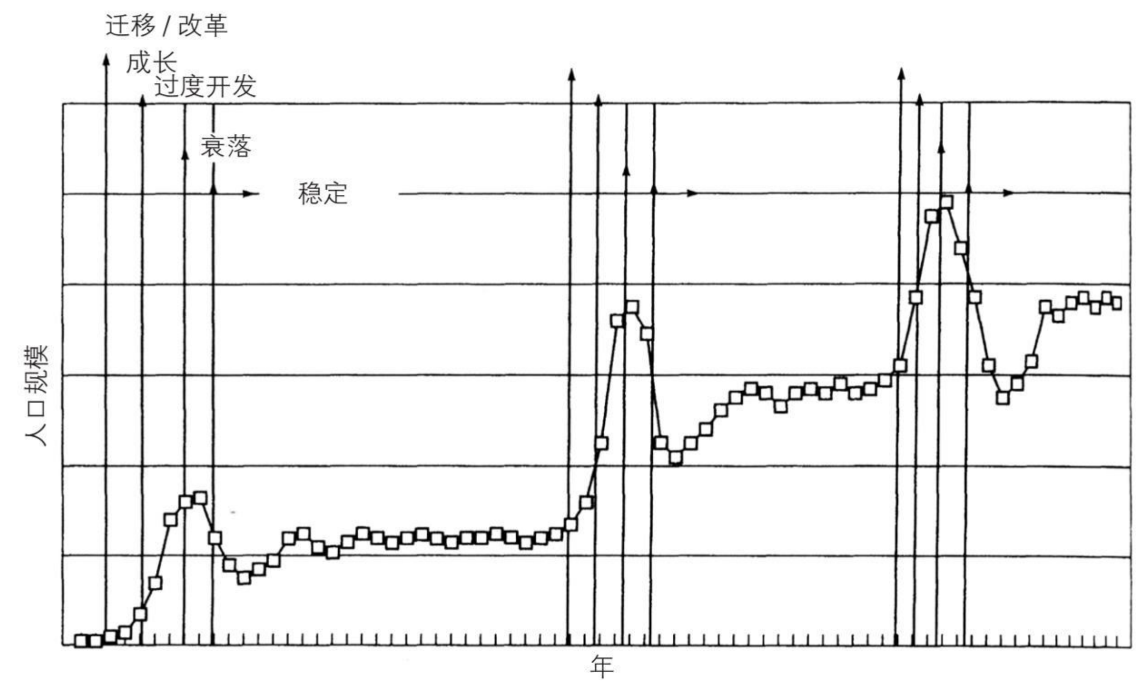
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[illegible][49][illegible]——[illegible]

[illegible]5.3[illegible]




[illegible]5.3 [illegible]

[illegible]

# [illegible]

[illegible]40[illegible]

[illegible]30[illegible]6[illegible]

[illegible]

[illegible]

[illegible]

[illegible]·[illegible]·[illegible]·[illegible]1999[illegible]1998[illegible]·[illegible]·[illegible]1989[illegible]·[illegible]1999[illegible]·[illegible]1998[illegible]·[illegible]——[illegible]40[illegible]1998[illegible]·[illegible]·[illegible]·[illegible]1987[illegible]1995[illegible]·[illegible]

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[1] [illegible]·[illegible]·[illegible]40[illegible]1987[illegible]

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[7] [illegible]·[illegible]1999[illegible]10[illegible]

[8] [illegible]·[illegible]John Snyder[illegible]C.[illegible]·[illegible]C. Leland Rodgers[illegible]1995[illegible]3[illegible]5[illegible]6[illegible]

[9] [illegible]·[illegible]·[illegible]97[illegible]

[10] [illegible]·[illegible]·[illegible]88[illegible]

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[19] [illegible]·[illegible]·[illegible]115[illegible]

[20] [illegible]·[illegible]·[illegible]119[illegible]123—125[illegible]

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[22] [illegible]·[illegible]·[illegible]·[illegible]7[illegible]

[23] [illegible]·A.[illegible]Richard A. Fortey[illegible]——[illegible]40[illegible]1998[illegible]89[illegible]

[24] [illegible]110[illegible]

[25] [illegible]·[illegible]·[illegible]·[illegible]125—129[illegible]

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[35] [illegible]·W.[illegible]1997[illegible]450[illegible]

[36] [illegible]·[illegible]2002[illegible]3[illegible]76—83[illegible]Bedout[illegible]

[37] [illegible]“[illegible]”[illegible]·[illegible]·[illegible]Jeannin Davis Kimball[illegible]·[illegible]Mona Behan[illegible]2002[illegible]6[illegible]

[38] [illegible]·[illegible]Tim Flannery[illegible]2001[illegible]1[illegible]

[39] [illegible]219—225[illegible]

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[41] □□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1988□□□□19□□

[42] □□□□□□□□□□·□□□1831—1914□□□□“□□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□“□□□”□□□□□□□□□□□□□□□□□□□□□1863—1945□□□□□□□□“□□□□”□□□□□□□□□□□□□□□□□48□□□□□□

[43] □□·□□□□□□□□□□□□□□□□□□1998□5□30□□□28—33□□□□□□□□□□□□□□□□□□

[44] □□·□□□□□□□□·□□□□□□□□□□□91□□

[45] □□□□□□□□□□27□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

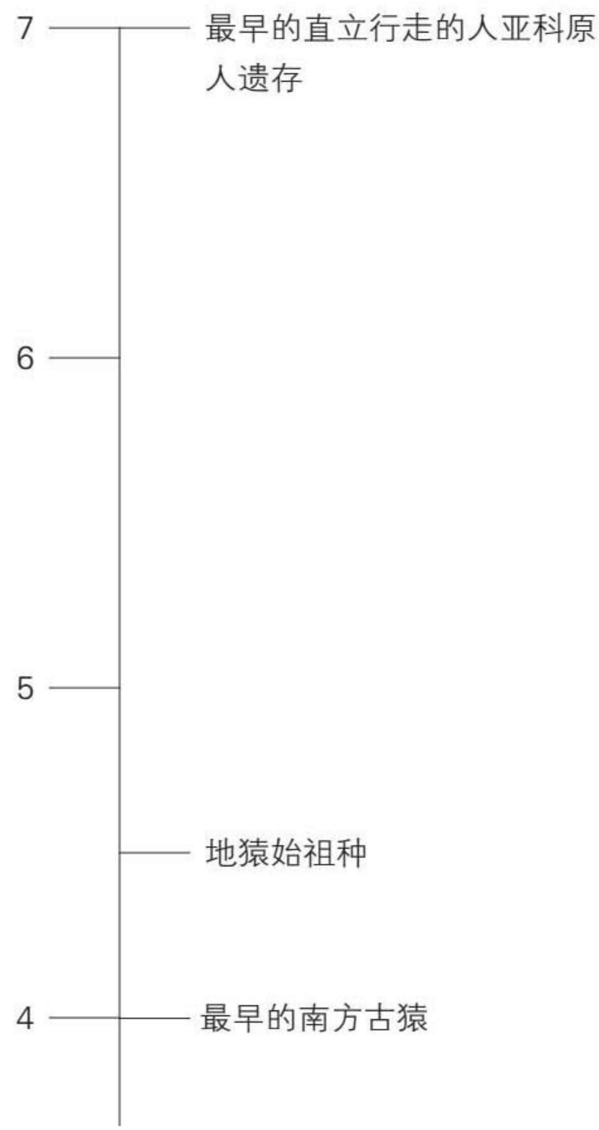
[46] □□□□□□□□□□22—24□□

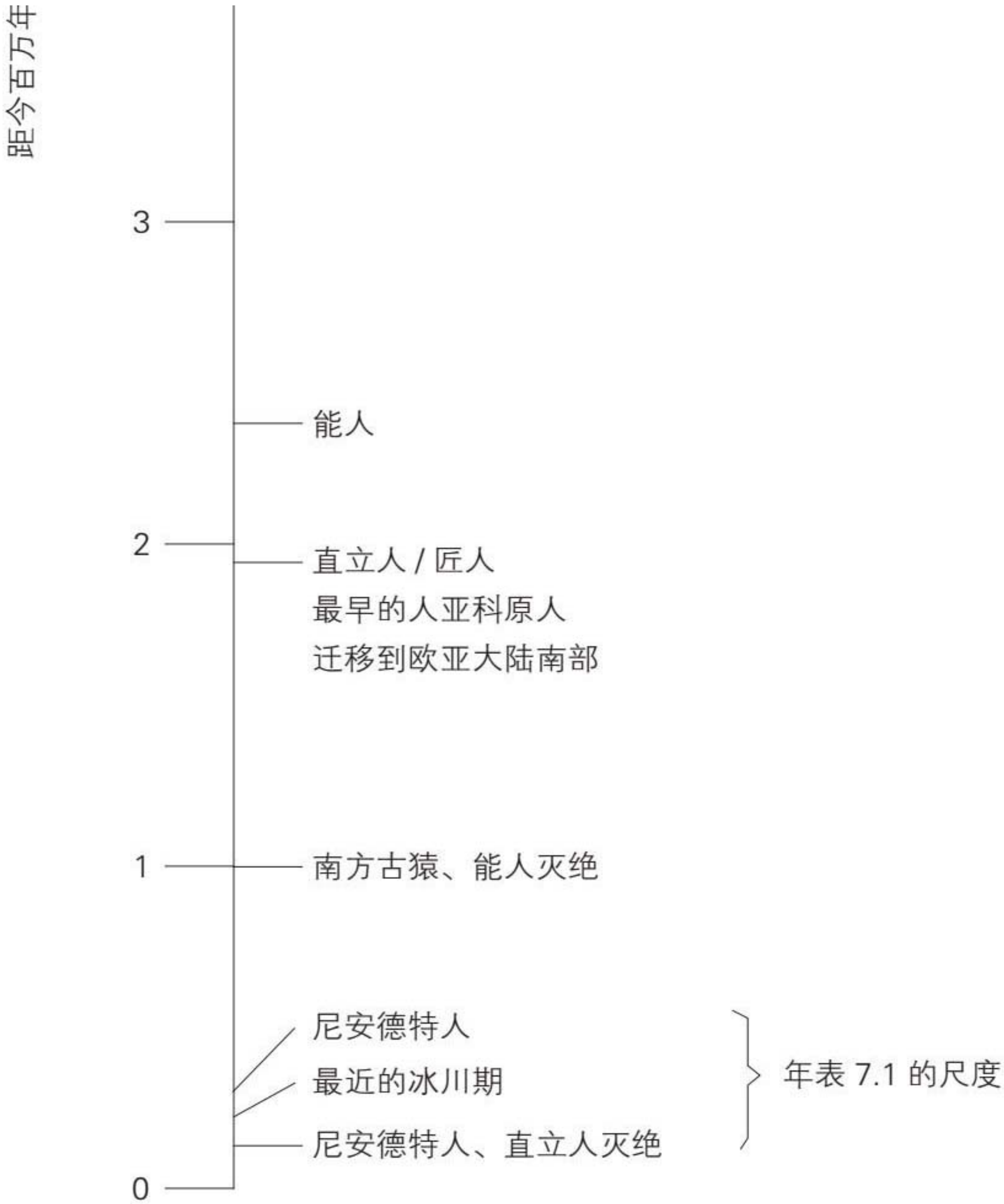
[47] □□□□□□□□□□22□□

[48] □□□□□□□□□□Australasia□□□□□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1995□□□□□□□□□□□□□□□□□344□□MIGODS□□□□Migration□□□□□Innovation□□□□□Growth□□□□□□Overexploitation□□□□□Decline□□□□□Stabilization□□□□□□□□□□□□——□□□

[49] “□□□□Leibig□□□□□□□□……□□□□□□□□□□□□□□□□□□□□□□□□”□□□·W.□□□□Allen W. Johnson□□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□2□□□□□□□□□□□□□□□2000□□□□14—15□□□

# [illegible]3[illegible]
# [illegible]


7
最早的直立行走的人亚科原人遗存
6
5
地猿始祖种
4
最早的南方古猿


距今百万年
3
能人
2
直立人 / 匠人
最早的人亚科原人
迁移到欧亚大陆南部
1
南方古猿、能人灭绝
尼安德特人
最近的冰川期
尼安德特人、直立人灭绝
0
年表 7.1 的尺度

**[illegible]6.1 [illegible]700[illegible]**

# [illegible]6[illegible]
# [illegible]

[illegible]——[illegible]——[illegible]

[illegible]

[illegible]

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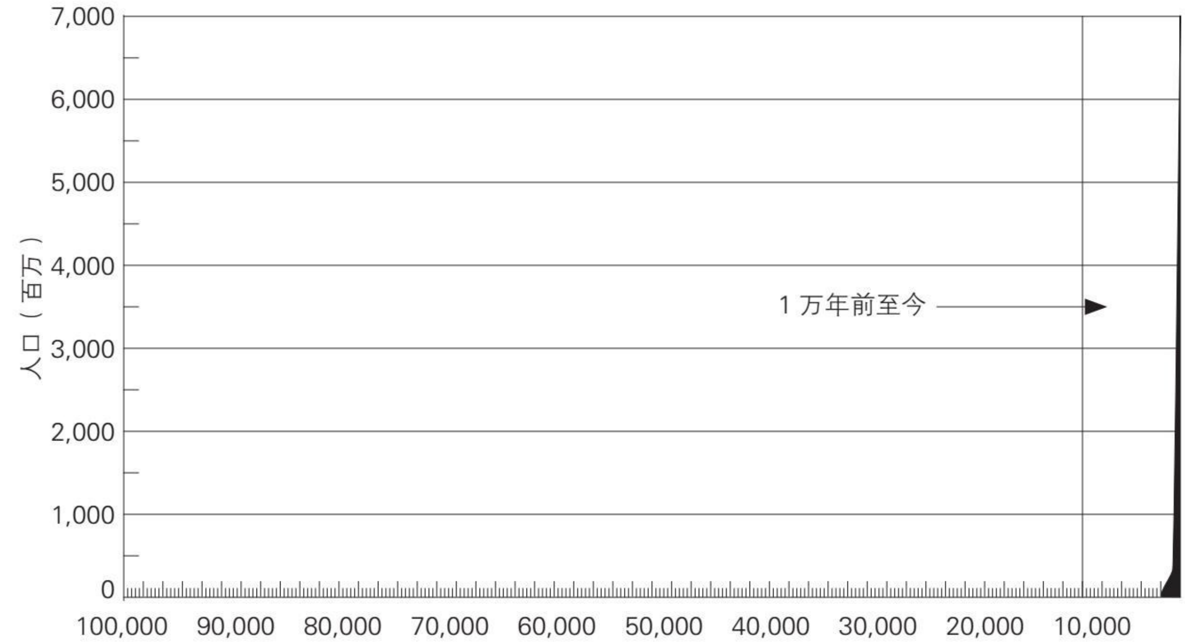
[illegible]6.1[illegible]“[illegible]”[illegible]1[illegible]6000[illegible]1[illegible]60[illegible]6.1[illegible]5[illegible]NPP[illegible]“[illegible]”[illegible]25%[illegible]40%[illegible]·[illegible]“[illegible]1/4[illegible]”[3]

**[illegible]6.1 [illegible]=1000[illegible]/[illegible]**

|  | 食物（含喂养动物） | 家庭与商业 | 工业与农业 | 交通 | 人均总计 | 全部人口（百万计） | 总计 |
|---|---|---|---|---|---|---|---|
| 技术社会（当代） | 10 | 66 | 91 | 63 | 230 | 6000 | 1 380 000 |
| 工业社会（1850 年前） | 7 | 32 | 24 | 14 | 77 | 1600 | 123 200 |
| 高级农业社会（距今1000年） | 6 | 12 | 7 | 1 | 26 | 250 | 6500 |
| 早期农耕社会（距今5000年） | 4 | 4 | 4 |  | 12 | 50 | 600 |
| 狩猎者（距今 1 万年） | 3 | 2 |  |  | 5 | 6 | 30 |
| 原始人 | 2 |  |  |  | 2 | 不详 | 不详 |

[illegible]I. G.[illegible]I. G. Simmons[illegible]2[illegible]1996[illegible]27[illegible]

[illegible]6.2[illegible]6.3[illegible]6.1[illegible]10[illegible]1[illegible]3[illegible]1[illegible]




**□6.1 □□□□□□10□□□□□□□□□□□□□6.2□□**

**□6.2 □□□□□□□□□□10□□□□□**

| 距今（年） | 世界人口估计数 | 与前一日期相比每百年增长率（%） | 所示翻番时间（年） | 数据来源 |
|---|---|---|---|---|
| 10 万 | 1 万 | — | — | 斯特林格，150 |
| 3 万 | 50 万 | 0.56 | 12403 | 利维-巴奇，31 |
| 1 万 | 600 万 | 1.25 | 5580 | 利维-巴奇，31 |
| 5000 | 5000 万 | 4.33 | 1635 | 比拉本 |
| 3000 | 12 000 万 | 4.47 | 1583 | 比拉本 |
| 2000 | 25 000 万 | 7.62 | 944 | 利维-巴奇，31 |
| 1000 | 25 000 万 | 0.00 | ∞ | 利维-巴奇，31 |
| 800 | 40 000 万 | 26.49 | 295 | 利维-巴奇，31 |

| 距今（年） | 世界人口估计数 | 与前一日期相比每百年增长率（%） | 所示翻番时间（年） | 数据来源 |
|---|---|---|---|---|
| 600 | 37500万 | −3.18 | 不详 | 利维−巴奇，31 |
| 400 | 57800万 | 24.5 | 320 | 利维−巴奇，31 |
| 300 | 68000万 | 17.65 | 427 | 利维−巴奇，31 |
| 200 | 95400万 | 40.29 | 205 | 利维−巴奇，31 |
| 100 | 163400万 | 71.28 | 129 | 利维−巴奇，31 |
| 50 | 253000万 | 139.74 | 79 | 利维−巴奇，31 |
| 0 | 600000万 | 462.42 | 40 | 利维−巴奇，31 |

□□□□□□□□□J. R. Biraben□□□□□□□□□□□□□□□□□□□□□34□□1997□□□□13—25□□□□□□·□□——□□□Massimo Livi-Bacci□□□□□□□□□□□□□□□□·□□□□Carl Ipsen□□□□□□□□□□□□□□□□1996□□□□□□·□□□□□Chris Stringer□□□□·□□□Robin Mckie□□□□□□□□□□□□□□□□□□□1996□□

**□6.3 □□□□□□□□□□□□□□□**

| 时代 | 起始（距今年） | 结束（距今年） | 起始人口（百万） | 结束人口（百万） | 每百年增长率（%） | 所示翻番时间（年） |
|---|---|---|---|---|---|---|
| 旧石器时代 | 10万 | 1万 | 0.01 | 6 | 0.71 | 9752 |
| 中期 | 10万 | 3万 | 0.01 | 0.5 | 0.56 | 12403 |
| 晚期 | 3万 | 1万 | 0.5 | 6 | 1.25 | 5579 |
| 农耕时代 | 1万 | 1000 | 6 | 250 | 4.23 | 1673 |
| 早期 | 1万 | 5000 | 6 | 50 | 4.33 | 1635 |
| 农耕文明 | 5000 | 1000 | 50 | 250 | 4.11 | 1723 |
| 公元第一个千年除外 | 5000 | 2000 | 50 | 250 | 5.51 | 1292 |
| 现代 | 1000 | 0 | 250 | 6000 | 37.41 | 218 |
| 早期 | 1000 | 200 | 250 | 950 | 18.16 | 415 |
| 工业化 | 200 | 0 | 950 | 6000 | 151.31 | 75 |

[illegible]“[illegible]”[illegible]4629[illegible]1096[illegible]24%[illegible]9627[illegible]1107[illegible]11%[illegible]6900[illegible]253[illegible]4%[illegible]4522[illegible]124[illegible]3%[illegible]25000[illegible]734[illegible]3%[illegible]27[illegible]25971[illegible]10%[illegible][4][illegible]6[illegible]5—6[illegible][5][illegible]10[illegible]10[illegible]

[illegible]10[illegible]“[illegible]”[illegible]“[illegible]”[illegible]——[illegible]“[illegible]——[illegible]——[illegible]

[illegible]‘[illegible]’[illegible]”[6]

## [illegible]

[illegible]“[illegible]”[illegible]——[illegible]

[illegible]“[illegible]”[illegible]

[illegible][7][illegible]

[illegible]——[illegible]

[illegible]·[illegible]
[illegible]Shirley Strum[illegible]“[illegible]”[illegible]Pumphouse Gang[illegible][8]

[illegible]·[illegible]John Mears[illegible]“[illegible]”[illegible][9][illegible]

[illegible]

> [illegible][10]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]——[illegible]——[illegible]——[illegible]“[illegible]”[illegible][11][illegible]·[illegible]Terrence Deacon[illegible]“[illegible]——[illegible]”[illegible][12]

[illegible]10[illegible]1[illegible][13][illegible]

# [illegible]

[illegible]20[illegible]

[illegible]·[illegible]Don Johanson[illegible]20[illegible]70[illegible]40%[illegible]300[illegible]350[illegible]

[illegible]——[illegible]

[illegible]400[illegible]700[illegible]10[illegible]4[illegible]“[illegible]”[illegible]“[illegible]”——[illegible]

[illegible]

[illegible]1967[illegible]·[illegible]Vincent Sarich[illegible]·[illegible]Alan Wilson[illegible][14][illegible]——[illegible][15]

[illegible]20[illegible]70[illegible]1500[illegible]3000[illegible]——[illegible]1.6%[illegible]98.4%[illegible]1.6%[illegible]6500[illegible]10%[illegible]500[illegible]700[illegible][16][illegible]——[illegible]800[illegible]1000[illegible]1300[illegible]1600[illegible]

[illegible]5[illegible]“[illegible]”[illegible][17]

[illegible]·[illegible]Jane Goodall[illegible]·[illegible]Dian Fossey[illegible]10[illegible]Great Apes[illegible][18][illegible]*Pan troglodytes*[illegible]

[illegible]“[illegible]”[illegible][19][illegible]——[illegible]San People[illegible]

[illegible]“[illegible]”[illegible]

[illegible][20]

[illegible]10[illegible]

## [illegible]

[illegible]

### [illegible]

[illegible][21][illegible]——[illegible]

[illegible]Old World[illegible]——[illegible]——[illegible]2000[illegible]2300[illegible]——520[illegible][22][illegible]1800[illegible]

[illegible]

[illegible]

## [illegible]

[illegible]Homininae[illegible]Hominidae[illegible]600[illegible]500[illegible]600[illegible]——[illegible]20[illegible]30[illegible]30[illegible]

[illegible]2000[illegible]600[illegible]“[illegible]”[illegible][23][illegible]*Ardipithecus ramidus kadabba*[illegible]2001[illegible]7[illegible][24][illegible]580[illegible]520[illegible][25][illegible]

[illegible][26][illegible]2000[illegible]

[illegible]1500[illegible]

[illegible]·[illegible][27]

[illegible]“[illegible]——[illegible]——[illegible]”[28]

[illegible]——[illegible]——[illegible]200[illegible]——1994[illegible]——[illegible]440[illegible]

## [illegible]

[illegible]

[illegible]1995[illegible]Lake Turkana[illegible]420[illegible][29][illegible]·[illegible]Don Johanson[illegible]20[illegible]70[illegible]40%[illegible]Lucy[illegible]1.1[illegible]1.5[illegible]370[illegible]300[illegible]

[illegible]Afar valley[illegible][30]1998[illegible]350[illegible]250[illegible]·[illegible]Mary Leakey[illegible]Laetoli[illegible]370[illegible]350[illegible]1995[illegible]*Australopithecus bahrelghazali*[illegible]300[illegible]350[illegible]20[illegible]

[illegible]380—450[illegible]300—400[illegible]1350[illegible]6.2[illegible]

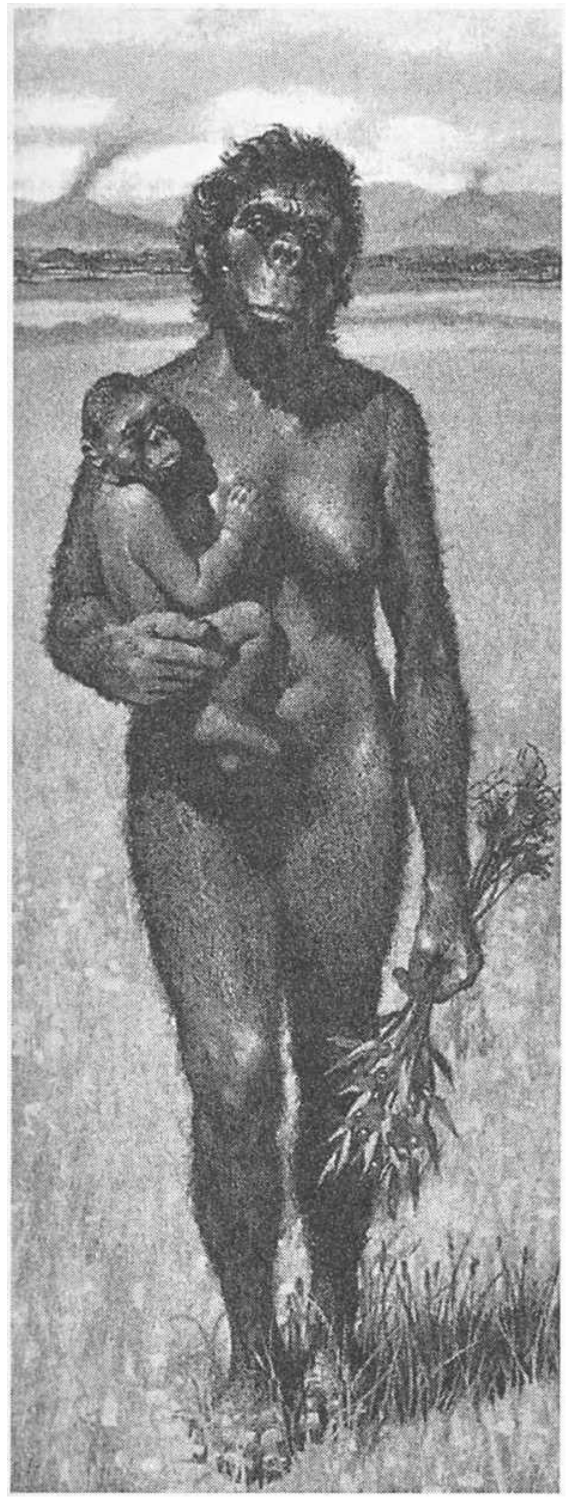
[illegible]“[illegible]”[illegible]300[illegible]100[illegible]*Paranthropus*[illegible]

[illegible][31][illegible]

[illegible]——[illegible]——[illegible]

[illegible]

[illegible]*Pan troglodytes*[illegible]“[illegible]”[illegible][32][illegible]20[illegible]



[illegible]6.2 [illegible]

[illegible]320[illegible]Hadar[illegible]1.1[illegible]·[illegible]G. Burenhult[illegible]5[illegible]1[illegible]1993[illegible]1[illegible]·[illegible]

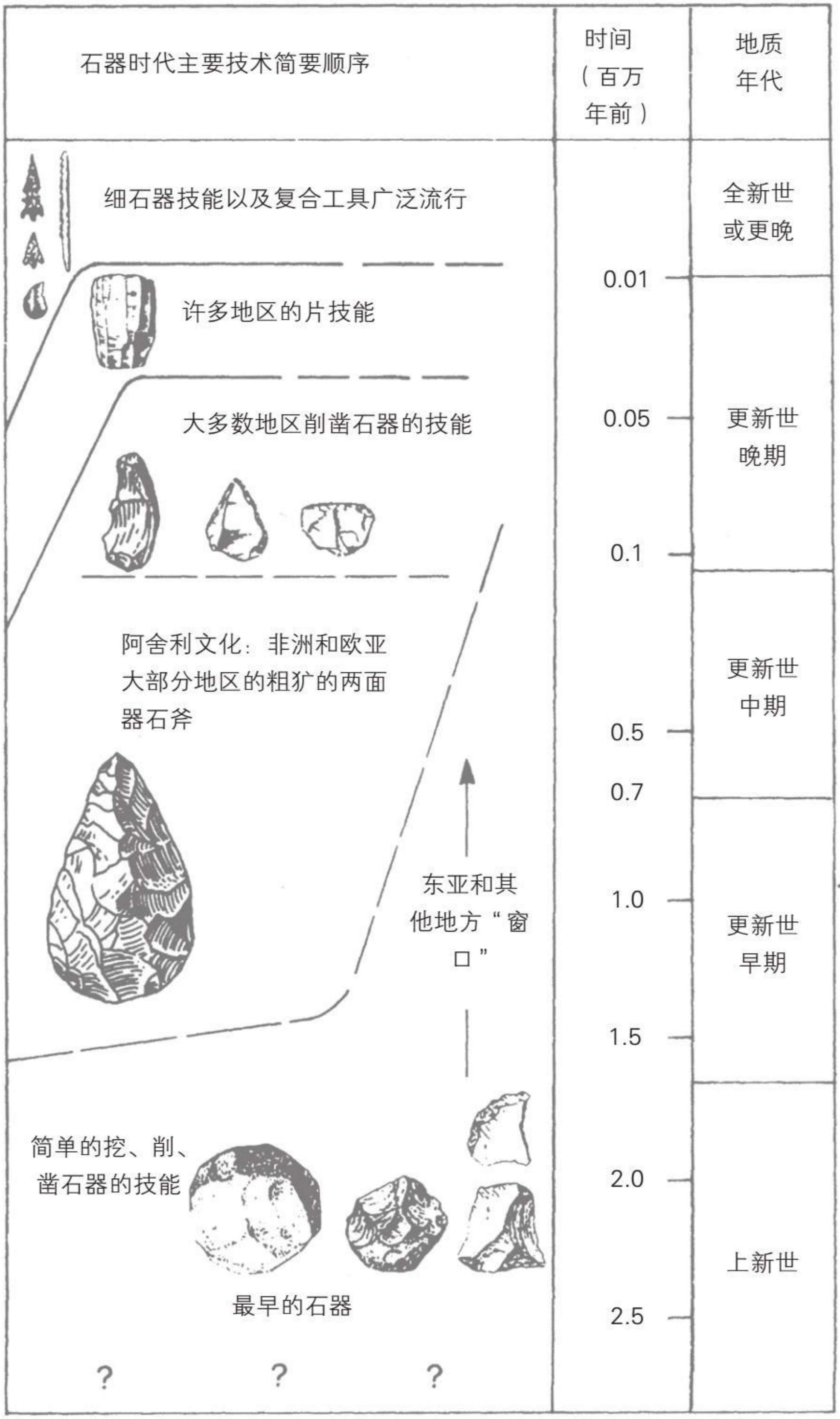
[illegible]

[illegible]Wenldon Owen[illegible]/[illegible]Bra Bocker[illegible]1993[illegible]·[illegible]

[illegible]Serengeti Plain[illegible]50[illegible]Olduvai Gorge[illegible]1960[illegible]·[illegible]Jonathan Leakey[illegible]——[illegible]·[illegible]Louis Leakey[illegible]——[illegible]1.4[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]*Homo habilis*[illegible]

[illegible]“[illegible]”[illegible]600—800[illegible]230[illegible]250[illegible]“[illegible]”[illegible][33][illegible][34]

[illegible]Oldowan[illegible]200[illegible]25[illegible]6.3[illegible]“[illegible]”[illegible]


石器时代主要技术简要顺序
时间（百万年前）
地质年代
细石器技能以及复合工具广泛流行
全新世或更晚
0.01
许多地区的片技能
大多数地区削凿石器的技能
0.05
更新世晚期
0.1
阿舍利文化：非洲和欧亚大部分地区的粗犷的两面器石斧
更新世中期
0.5
0.7
东亚和其他地方“窗口”
1.0
更新世早期
1.5
简单的挖、削、凿石器的技能
2.0
最早的石器
上新世
2.5
？
？
？

**[illegible]6.3 250[illegible]**

[illegible]·[illegible]Steven Jones[illegible]·[illegible]Robert Martin[illegible]·[illegible]David Pilbeam[illegible]·[illegible]1992[illegible]357[illegible]

[illegible]Baldwinian adaptation[illegible]19[illegible]

[illegible]——[illegible][35][illegible]

[illegible][36][illegible]

[illegible]

[illegible]5—30[illegible]

[illegible]·[illegible]

## [illegible]

[illegible]——[illegible]——[illegible]6[illegible]

[illegible]180[illegible]*Homo erectus*[illegible]*Homo ergaster*[illegible][37][illegible]1984[illegible]Nariokotome[illegible]180[illegible]“[illegible]”[illegible]Turkana Boy[illegible]1.5[illegible]880[illegible]1/3[illegible][38]

[illegible]100[illegible]/[illegible]850[illegible]1000[illegible]150[illegible]Acheulian[illegible]“[illegible]”[illegible]

[illegible][39]

[illegible][40][illegible]·[illegible]Steven Mithen[illegible][41][illegible]100[illegible]

[illegible]70[illegible]1891[illegible]20[illegible]20[illegible]——[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]20[illegible][42][illegible]

## [illegible]100[illegible]

[illegible]100[illegible]1300[illegible]20[illegible]Levallois[illegible]Mousterian[illegible]

[illegible]·[illegible][43][illegible]1000[illegible]100[illegible]9.6[illegible]1[illegible]10[illegible]100[illegible][44][illegible]

[illegible]“[illegible]”[illegible]20%[illegible]3%[illegible]

[illegible]

[illegible]

[illegible][45][illegible][46][illegible]——[illegible]——[illegible][47]

[illegible]——[illegible]——[illegible]

[illegible]

[illegible]50[illegible]Neanderthal[illegible]1856[illegible]*Homo sapiens neanderthalensis*[illegible]70[illegible]55[illegible][48]

[illegible]13[illegible]25000[illegible]

## [illegible]

[illegible]25[illegible]

[illegible]

[illegible]·[illegible]1999[illegible]4[illegible]·[illegible]·[illegible]1992[illegible]·[illegible]·[illegible]

[illegible]1994[illegible]1981[illegible]·[illegible]1991[illegible]·[illegible]2000[illegible]·[illegible]5[illegible]1993—1994[illegible]·[illegible]2001[illegible]10[illegible]·[illegible]1995[illegible]·[illegible]Ian Tattersall[illegible]1998[illegible]·[illegible]Robert Wenke[illegible]3000[illegible]1990[illegible]3[illegible]·[illegible]1999[illegible]·[illegible]1995[illegible]·[illegible]1996[illegible]·[illegible]1997[illegible]·[illegible]1994[illegible]1997[illegible]·[illegible]1991[illegible]1998[illegible]·[illegible]1992[illegible]·[illegible]Craig Stanford[illegible]1999[illegible]2001[illegible]2000[illegible]·[illegible]

---

[1] [illegible]·[illegible]·[illegible]·[illegible]1999[illegible]

[2] [illegible]1994[illegible]

[3] [illegible]·[illegible]1986[illegible]287[illegible]NPP[illegible]I. G.[illegible]1996[illegible]2[illegible]361[illegible]J. M.[illegible]J. M. Diamond[illegible]1987[illegible]8[illegible]6[illegible]479—480[illegible]

[4] [illegible]2000—2001[illegible]2000[illegible]246[illegible]248[illegible]

[5] [illegible]·[illegible]·[illegible]1995[illegible]

[6] A. J.[illegible]1993[illegible]33[illegible]

[7] [illegible]·[illegible]·[illegible]“[illegible]”[illegible]19[illegible]

[8] [illegible]·[illegible]1999[illegible]28—29[illegible]

[9] [illegible]·[illegible]·[illegible]Michael Adas[illegible]2001[illegible]65[illegible]·[illegible]2000[illegible]

[10] [illegible]34[illegible]

[11] [illegible]·[illegible]1990[illegible]157[illegible]·[illegible]——[illegible]1998[illegible]82[illegible]

[12] [illegible]·W.[illegible]1997[illegible]397[illegible]

[13] [illegible]·[illegible]·[illegible]1996[illegible]150[illegible]

[14] [illegible]·[illegible]·[illegible]1967[illegible]12[illegible]1[illegible]1200—1203[illegible]

[15] “[illegible]”[illegible]·[illegible]1999[illegible]4[illegible]41—45[illegible]

[16] [illegible]·[illegible]84—85[illegible]

[17] [illegible]69—81[illegible]·[illegible]1991[illegible]

[18] [illegible]·[illegible]——[illegible]2001[illegible]

[19] [illegible]foragers[illegible]·[illegible]Kung San[illegible]1979[illegible]·W.[illegible]Allen W. Johnson[illegible]·[illegible]Timothy Earle[illegible]2000[illegible]3[illegible]

[20] [illegible]·[illegible]50[illegible]10[illegible]1[illegible]2001[illegible]5—15[illegible]

[21] [illegible]·[illegible]10[illegible]

[22] [illegible]·[illegible]55[illegible]

[23] [illegible]·[illegible]2002[illegible]2[illegible]15[illegible]1214—1219[illegible]

[24] [illegible]·[illegible]·[illegible]Yohannes Halle Selassie[illegible]2001[illegible]7[illegible]12[illegible]178—181[illegible]

[25] [illegible]900[illegible]220[illegible]

[26] [illegible]·[illegible]17[illegible]“[illegible]”[illegible]

[27] [illegible]·[illegible]·[illegible]1998[illegible]152—156[illegible]·[illegible]108—109[illegible]

[28] [illegible]·[illegible]·[illegible]156[illegible]

[29] [illegible]“[illegible]”[illegible]“[illegible]”[illegible]20[illegible]50[illegible]

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[31] [illegible]

[32] [illegible]·[illegible]·[illegible]1[illegible]1[illegible]1993[illegible]41[illegible]

[33] [illegible]·[illegible]·[illegible]1998[illegible]133—134[illegible]

[34] [illegible]·[illegible]124[illegible]

[35] [illegible]·[illegible]“[illegible]”[illegible]

[36] [illegible]

[37] [illegible]“[illegible]”[illegible]

[38] [illegible]·[illegible]2000[illegible]92—96[illegible]

[39] [illegible]·[illegible]·[illegible]·[illegible]1992[illegible]

[40] [illegible]358[illegible]

[41] [illegible]·[illegible]1996[illegible]179[illegible]

[42] [illegible]·[illegible]1[illegible]1998[illegible]2[illegible]

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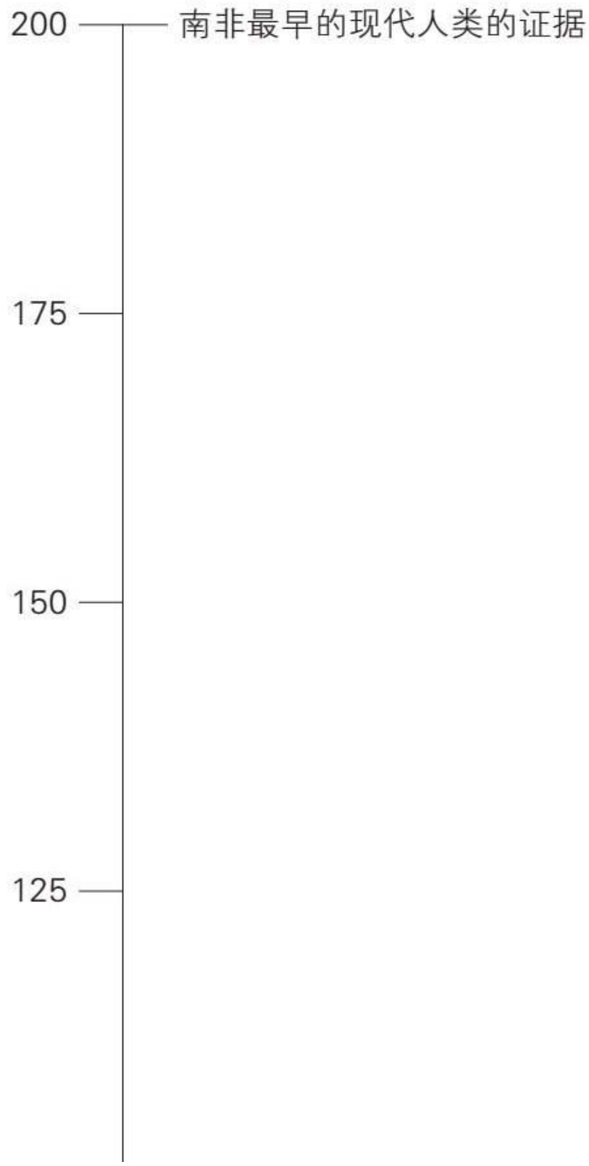
[44] [illegible]·[illegible]1993[illegible]163[illegible]

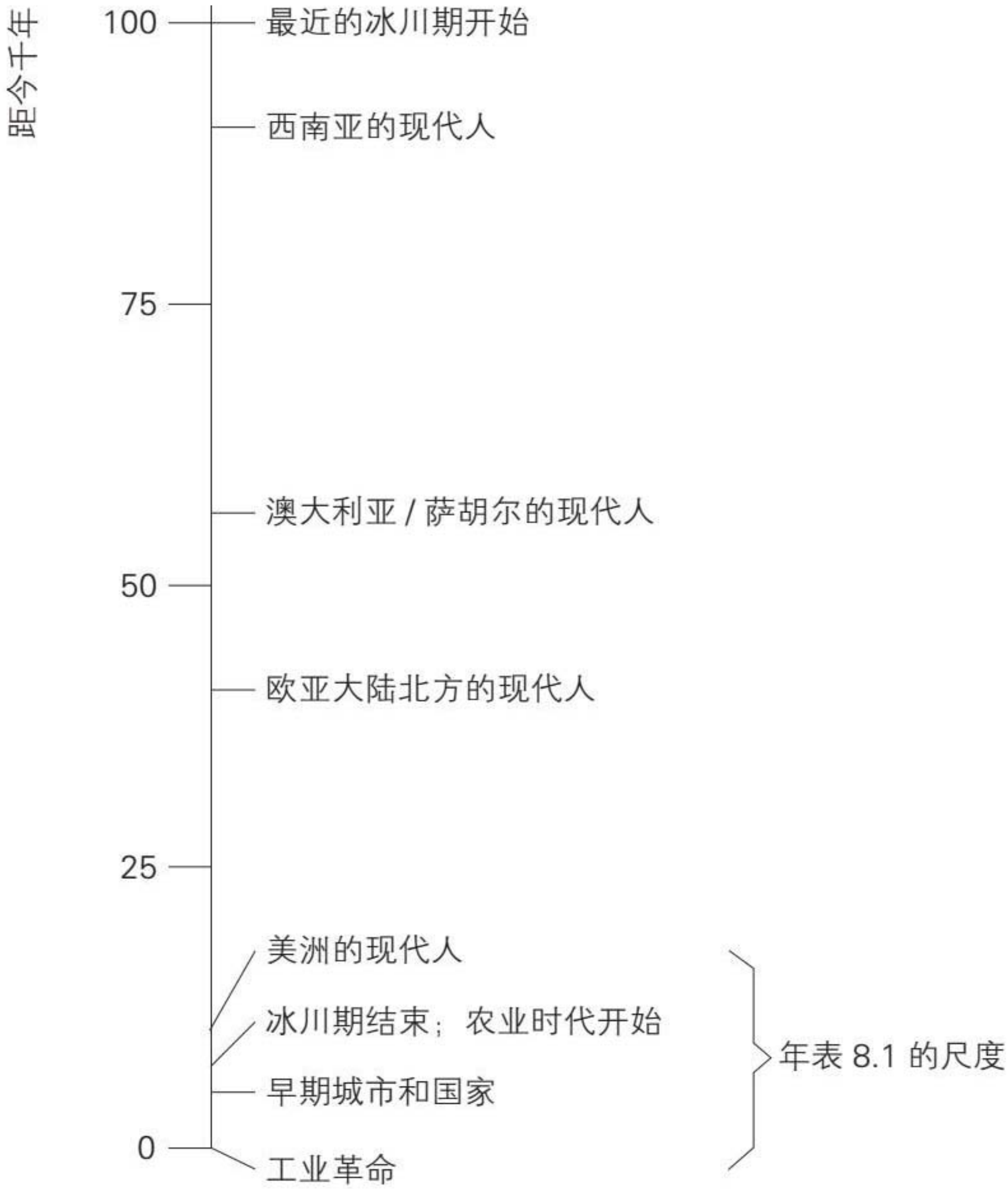
[45] [illegible]·[illegible]66—68[illegible]

[46] [illegible]·[illegible]1997[illegible]·J.[illegible]Donna J. Haraway[illegible]1991[illegible]107[illegible]

[47] [illegible]·[illegible]1995[illegible]165—171[illegible]

[48] [illegible]96[illegible]


200
南非最早的现代人类的证据
175
150
125



距今千年
100
75
50
25
0
最近的冰川期开始
西南亚的现代人
澳大利亚 / 萨胡尔的现代人
欧亚大陆北方的现代人
美洲的现代人
冰川期结束；农业时代开始
早期城市和国家
工业革命
年表 8.1 的尺度


**[illegible]7.1 [illegible]20[illegible]**

# [illegible]7[illegible]
# [illegible]

## [illegible]

[illegible]

[illegible]·[illegible]Henry Plotkin[illegible]

> [illegible]10[illegible]200[illegible]25[illegible]20[illegible]——[illegible]“[illegible]”[illegible]1000[illegible]……[illegible][1]

[illegible]·[illegible]Noam Chomsky[illegible]“[illegible]”[illegible]“[illegible]”[illegible]——[illegible][2]

[illegible]·[illegible]10[illegible]——[illegible]——[illegible]“[illegible]”[illegible][3][illegible]“[illegible]”[illegible]“[illegible]”[illegible][4]

[illegible]·[illegible]——[illegible]“[illegible]”[illegible]“[illegible]”[illegible][5][illegible]Pavlov[illegible]——“[illegible]”——[illegible]

[illegible]“[illegible]——[illegible]”[illegible]402[illegible]3[illegible]

[illegible]Baldwinian evolution[illegible][6][illegible]

[illegible]

[illegible]——[illegible]·[illegible]

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**[illegible]7.1 [illegible]**

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[illegible]*Homo helmei*[illegible]——[illegible]——[illegible]13[illegible]19[illegible]455[illegible]

*H. helmei*[illegible]25[illegible]——30[illegible]——[illegible]——4[illegible]5[illegible]——[illegible]H. helmei[illegible]H. helmei[illegible]H. helmei[illegible]25[illegible]——30[illegible]529[illegible]

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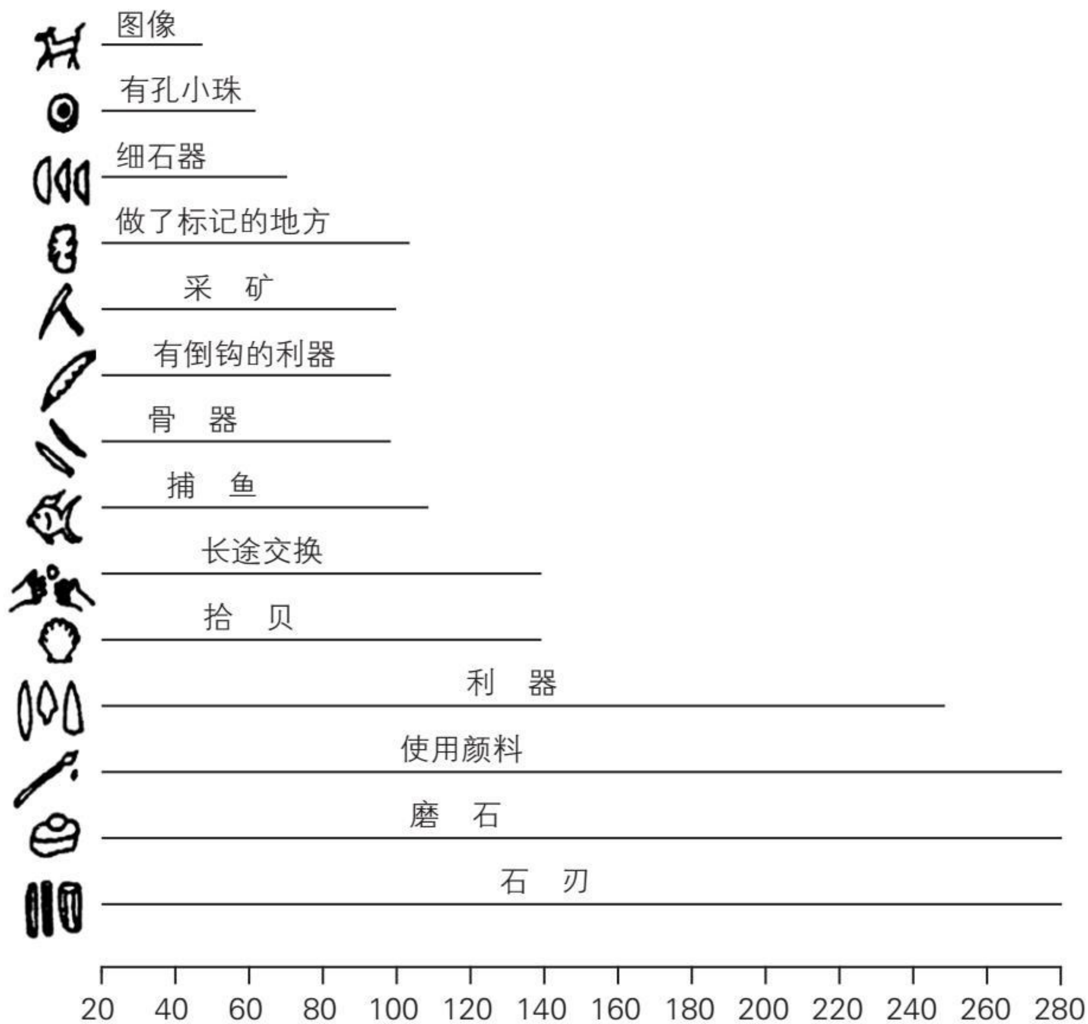
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[illegible]“[illegible]”[illegible]“[illegible]”[illegible]（529[illegible]

[illegible]25[illegible]7.2[illegible]25[illegible][14][illegible]5[illegible]




**[illegible]7.2** [illegible]

[illegible]39[illegible]2000[illegible]530[illegible]

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[illegible]

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[illegible]

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[illegible]

[illegible]

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[illegible]·[illegible]

> [illegible]Twi[illegible]——[illegible]——“[illegible]”[illegible][29]

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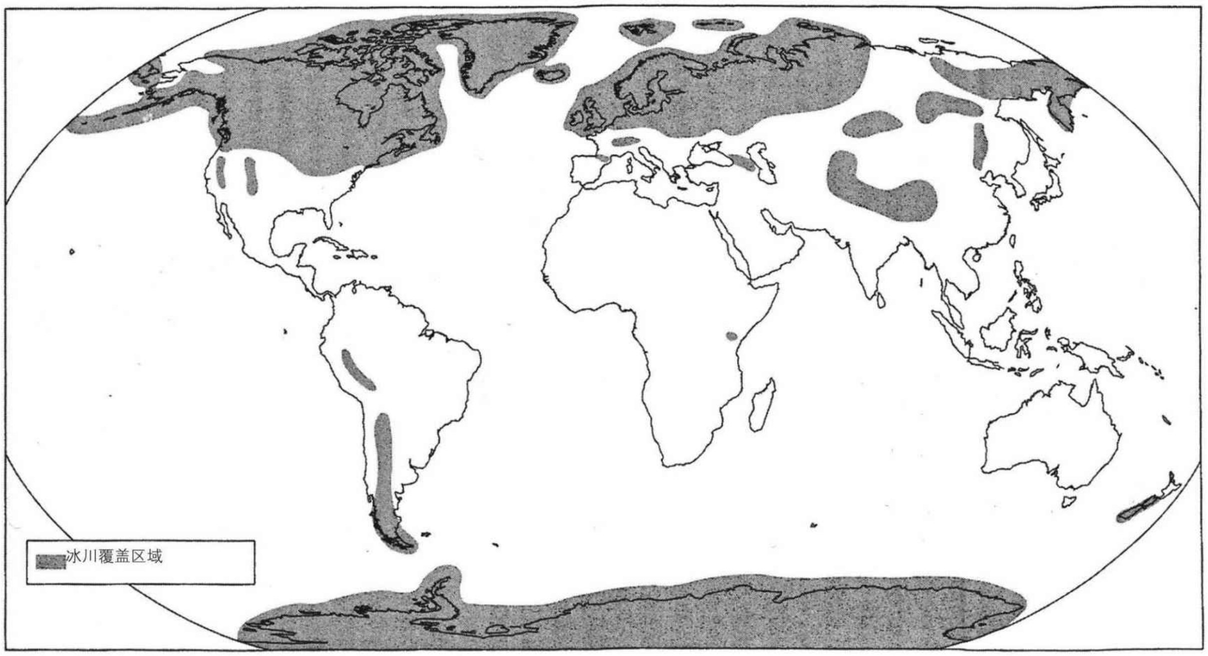
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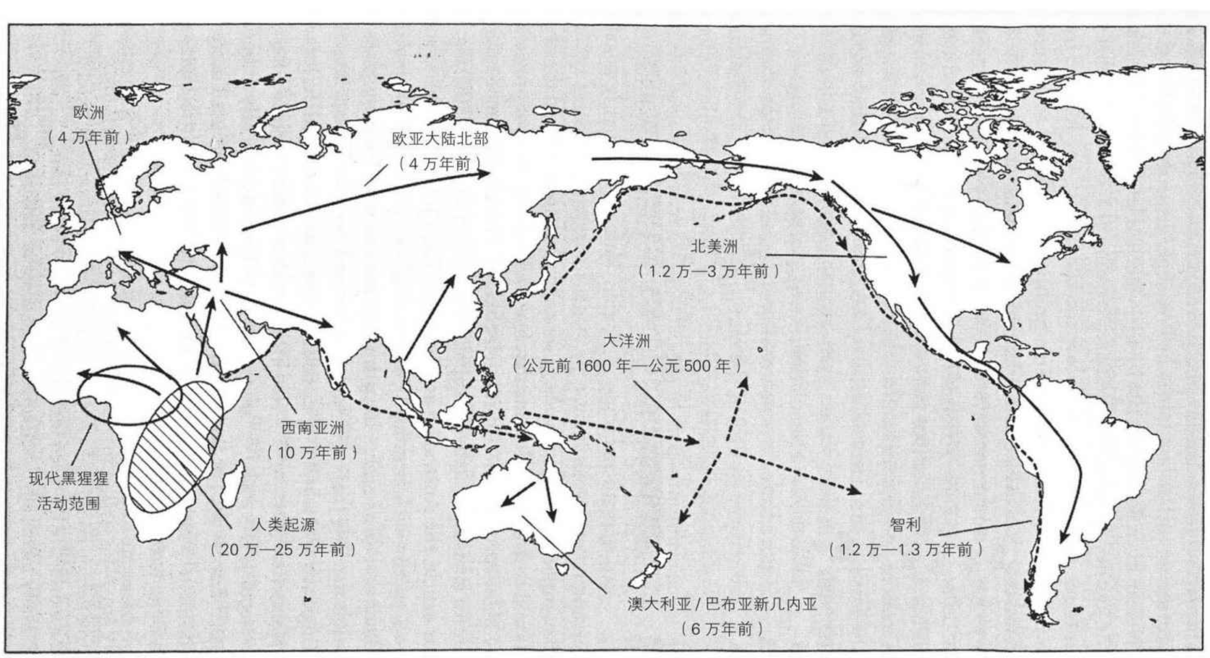
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[illegible]7.1 [illegible]

[illegible]·[illegible]2[illegible]1998[illegible]89[illegible]




[illegible]7.2 [illegible]10[illegible]

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[illegible]/[illegible][38][illegible]·[illegible]Rhys Jones[illegible]“[illegible]”[illegible]fire stick farming[illegible][39][illegible]4.5[illegible][40][illegible]·[illegible]Stephen Pyne[illegible]

[illegible]

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[illegible][48][illegible]“[illegible]”[illegible]·[illegible]Olga Soffer[illegible]30[illegible]2[illegible]Mezhirich[illegible]5[illegible]80[illegible]10[illegible]“[illegible]”[illegible][49][illegible]30[illegible]9[illegible]Kostenki[illegible]21[illegible]200[illegible]10—15[illegible][50][illegible][51]

[illegible]——[illegible]2[illegible][52][illegible]·[illegible]Wilgie Mia[illegible]——[illegible]——[illegible][53]

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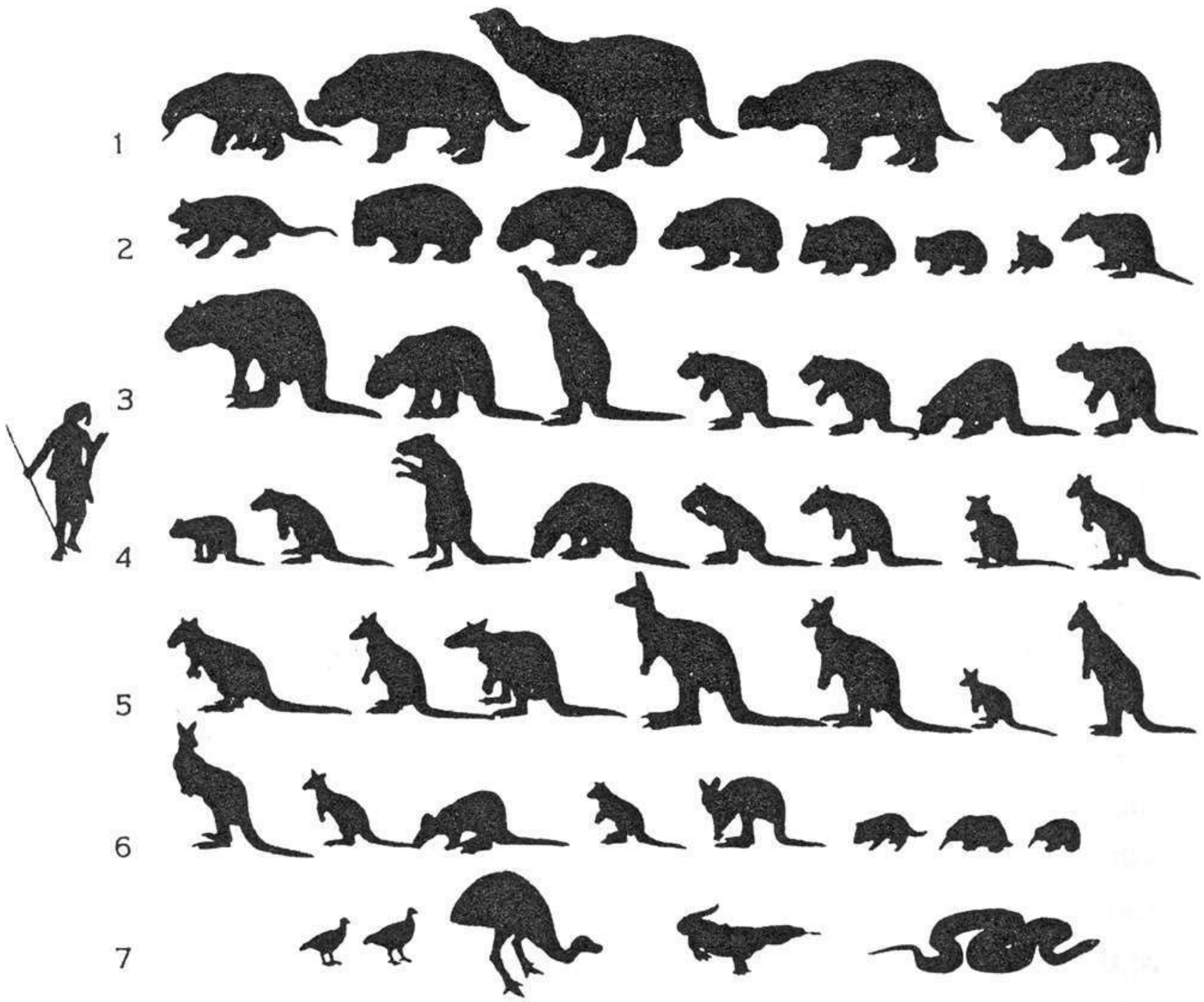
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[illegible][57][illegible]“[illegible]”[illegible]18[illegible]

[illegible][58][illegible]2[illegible]7.3[illegible]1[illegible][59][illegible]·[illegible]Alfred Wallace[illegible]1876[illegible]——[illegible]——[illegible]“[illegible]”[60]

[illegible][61][illegible]70%——80%[illegible]44[illegible]40%[illegible]14%[illegible][62][illegible][63]




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[24] [illegible]16[illegible]

[25] [illegible]·W. [illegible]·[illegible]2000[illegible]14[illegible]

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[27] [illegible]·[illegible]·[illegible]·M. [illegible]·W. [illegible]1957[illegible]·[illegible]S. C. [illegible]·[illegible]8[illegible]1969[illegible]165—212[illegible]

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[34] [illegible]·[illegible]·R. [illegible]1959[illegible]

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[37] [illegible]·[illegible]123[illegible]

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[43] [illegible]·[illegible]5[illegible]2000[illegible]38—41[illegible]

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[45] [illegible]·[illegible]·[illegible]1992[illegible]

[46] [illegible]·[illegible]1999[illegible]42[illegible]·[illegible]·[illegible]2[illegible]W. W. [illegible]1994[illegible]2[illegible]

[47] [illegible]·G. [illegible]1973[illegible]110[illegible]·[illegible]138—139[illegible]

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[51] [illegible]·[illegible]T. [illegible]·[illegible]·A. [illegible]——[illegible]1985[illegible]243[illegible]63[illegible]1989[illegible]726[illegible]

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[55] [illegible]·[illegible]100[illegible]

[56] [illegible]150[illegible]10[illegible]——[illegible]31[illegible]·M. [illegible]300[illegible]1990[illegible]25—39[illegible]“[illegible]”[illegible]

[57] [illegible]——[illegible]——[illegible]

[58] [illegible]4500[illegible]86[illegible]

[59] [illegible]4.5[illegible]·[illegible]2001[illegible]189—191[illegible]

[60] [illegible]·[illegible]181[illegible]

[61] [illegible]·G. [illegible]·F. [illegible]·K. [illegible]46000[illegible]2001[illegible]6[illegible]8[illegible]1888—1892[illegible]·[illegible]2001[illegible]6[illegible]8[illegible]1893—1896[illegible]“[illegible]”[illegible]100[illegible]4.6[illegible]

[62] [illegible]83[illegible]·S. [illegible]·G. [illegible]1984[illegible]

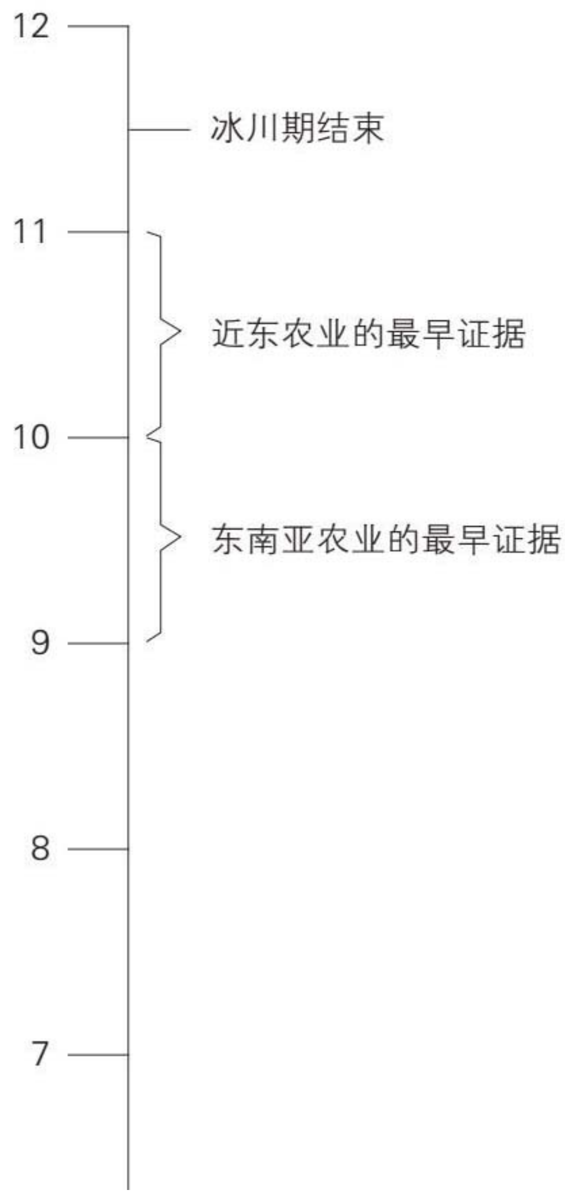
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[64] [illegible]101—104[illegible]

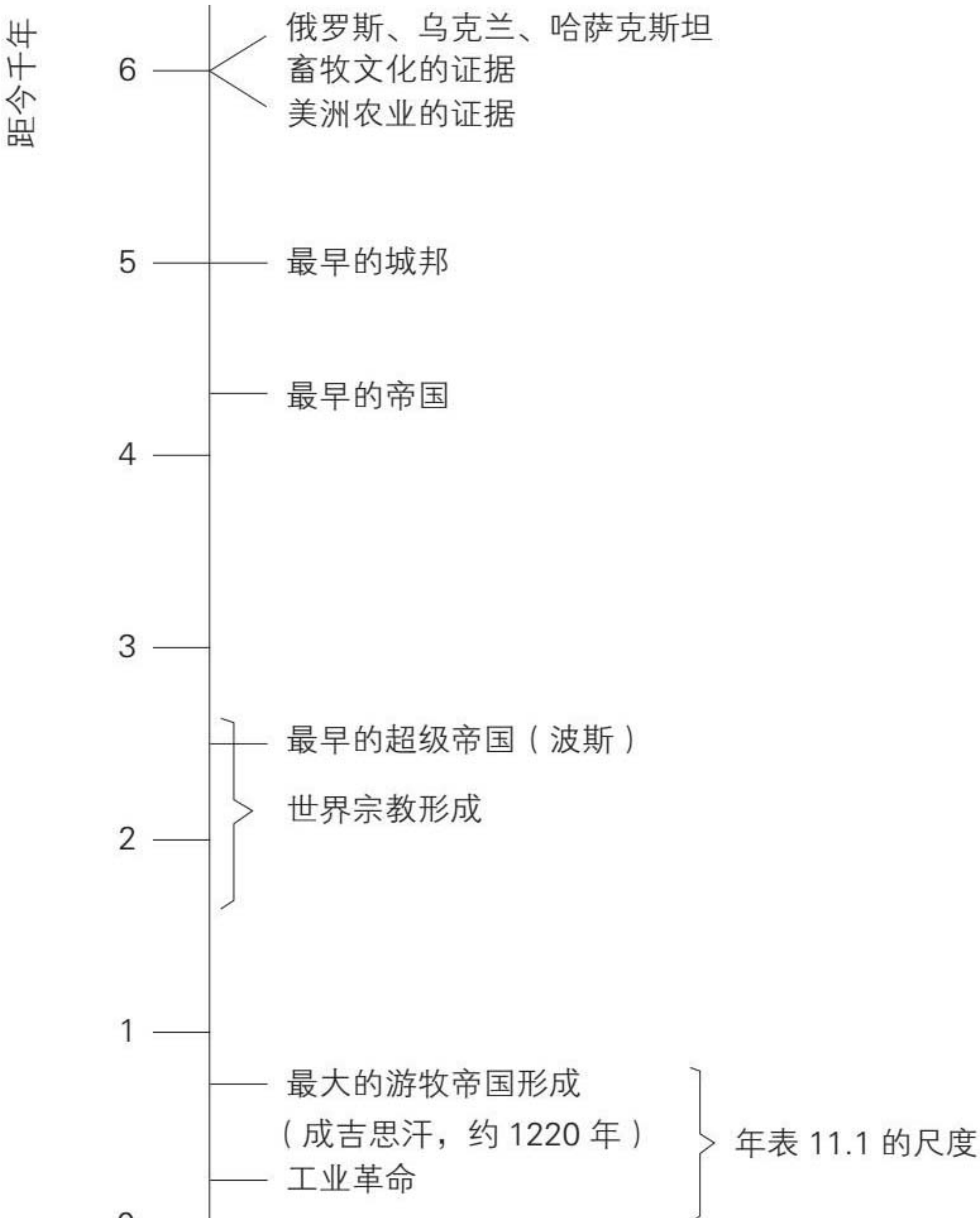
[65] [illegible]104[illegible]

[66] [illegible]5.3[illegible]——2.7[illegible]·G. [illegible]2[illegible]1999[illegible]395[illegible]3[illegible]477[illegible]

# [illegible]4[illegible]
# [illegible]



12
冰川期结束
11
近东农业的最早证据
10
东南亚农业的最早证据
9
8
7


距今千年
6
5
4
3
2
1
0
俄罗斯、乌克兰、哈萨克斯坦
畜牧文化的证据
美洲农业的证据
最早的城邦
最早的帝国
最早的超级帝国（波斯）
世界宗教形成
最大的游牧帝国形成
（成吉思汗，约 1220 年）
工业革命
年表 11.1 的尺度

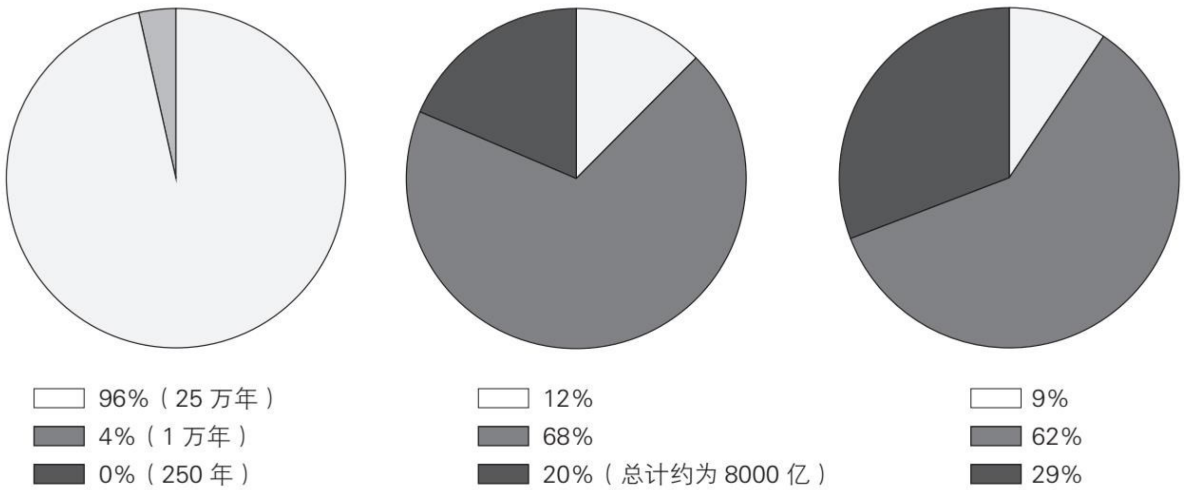
**[illegible]8.1 [illegible]5000[illegible]**

# [illegible]8[illegible]
# [illegible]

[illegible]——[illegible]1/10[illegible]——[illegible][1]

[illegible]11500[illegible]1[illegible]8.1[illegible]

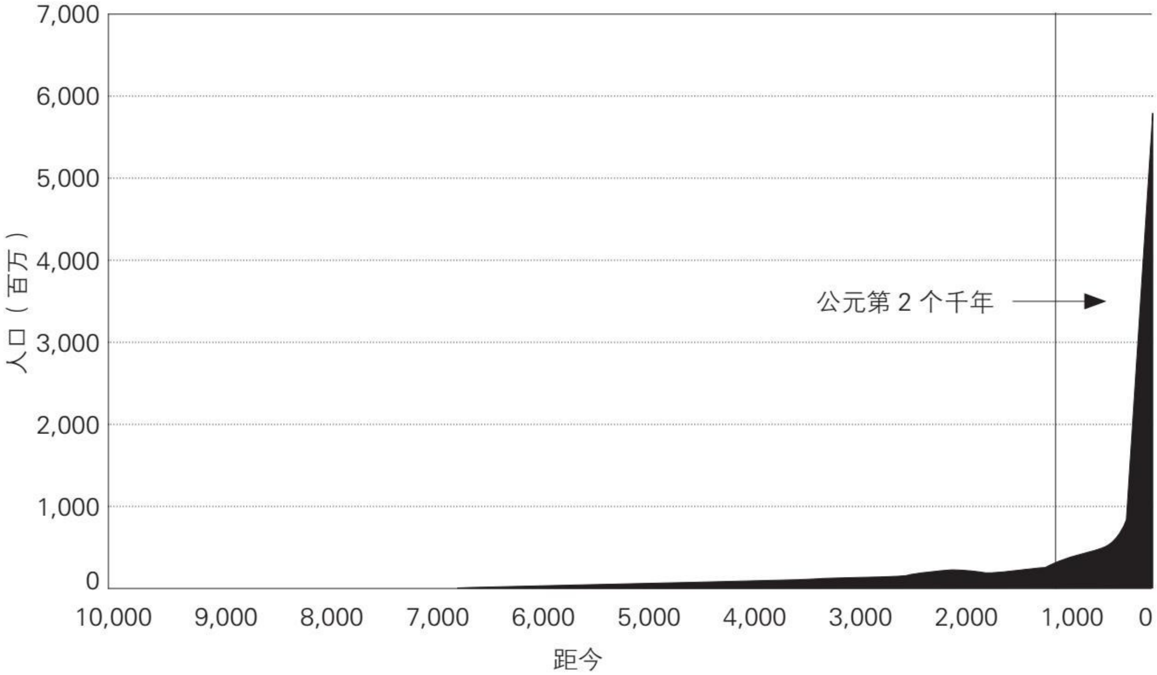
[illegible]




**[illegible]8.1 [illegible]**

[illegible]a[illegible]24000[illegible]10000[illegible]200[illegible]b[illegible]——[illegible]1992[illegible]31[illegible]33[illegible]800[illegible]c[illegible]——[illegible]31[illegible]33[illegible]

[illegible]8.2[illegible]6.2[illegible]6.3[illegible]50—100[illegible][2][illegible]6.2[illegible]6.3[illegible]1[illegible]600[illegible]5000[illegible]5000[illegible]5000[illegible]6—12[illegible][3][illegible]1600[illegible]6000[illegible]1[illegible]




**[illegible]8.2 [illegible]1[illegible]——[illegible]6.2[illegible]**

20[illegible]30[illegible]V.[illegible]·[illegible]“[illegible]”[illegible]1[illegible]8.1[illegible]11500[illegible]4000[illegible]7500[illegible]“[illegible]”[illegible]

**[illegible]8.1 [illegible]**

| 时代名称 | 大致时间段 | 重要特征 |
| --- | --- | --- |
| 时代 1：许多世界—— | 距今 30 万 /25 万—1 万 | 距今 25 万 /20 万—1 万年 人类最早适应性的技能；许多小型、联系松散的共同体；人口增长并且扩散；人类进入新的环境，在可居住的地方定居；旧石器时代和人类历史的开端 |
| 时代 2：几个世界 | 距今 10000—500 年 | 集约化和密集的、相互联系的居住点；逐渐增长的适应方式、新型的共同体、逐渐增长的人造环境、逐渐增长的人口；三种分离的世界区，以类似的轨迹、信息交换的不同协同方式制约下的不同速度发展 |
| 时代 3：一个世界 | 500 年前—现在 | 单一的、全球化体系；不同层次的集体的知识；加速索取资源；控制生物圈的资源；其他生物体灭绝 |

[illegible]10 000[illegible]11 000[illegible]5000[illegible]6000[illegible]20[illegible]

## [illegible]

[illegible]

[illegible]25 000[illegible]18 000[illegible]18 000[illegible]13 000—11 500[illegible]11 500[illegible]

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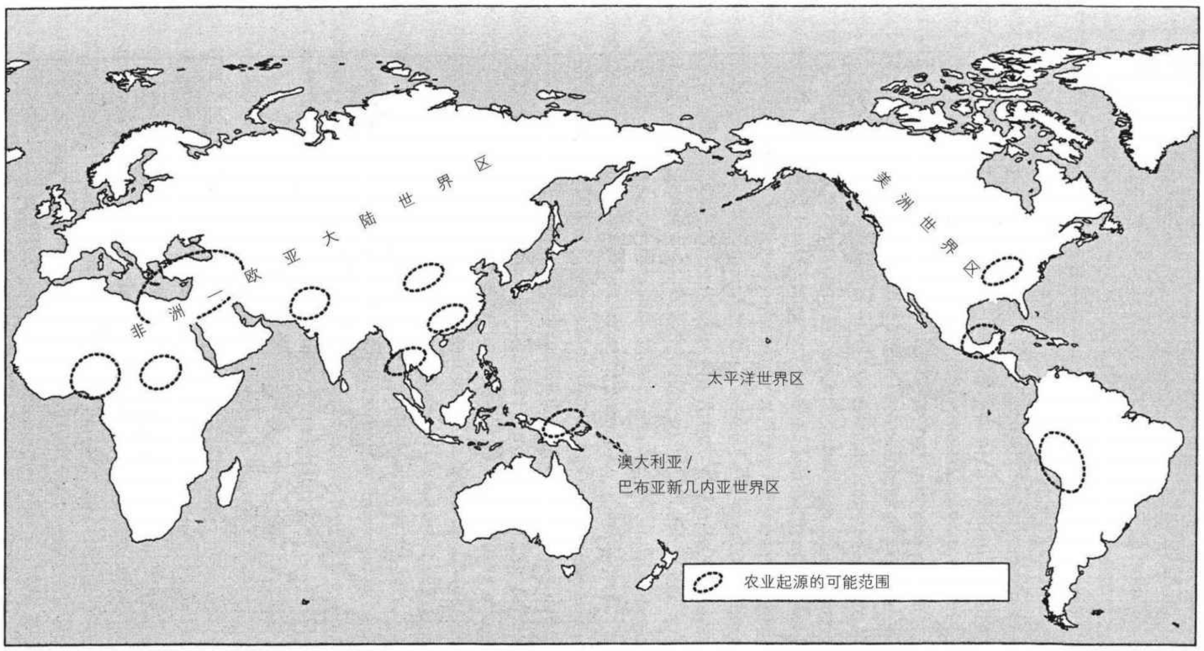
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## [illegible]

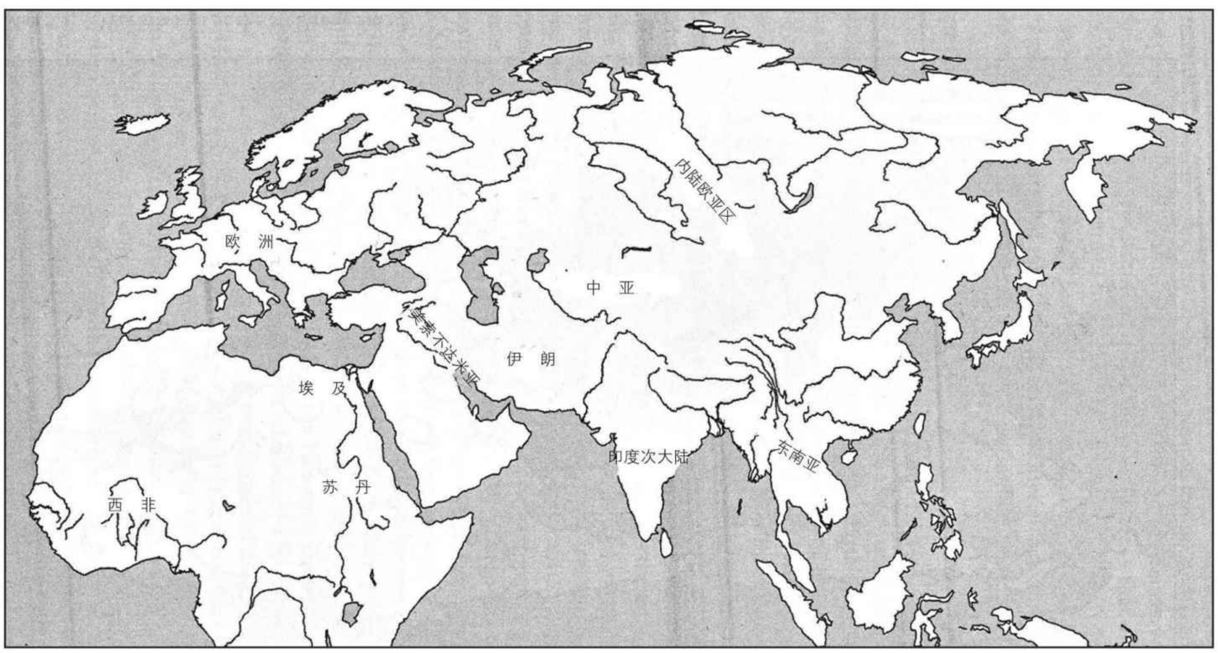
[illegible]·[illegible]“[illegible]”[5]

[illegible]4000[illegible]1600[illegible][6][illegible]3000[illegible]4000[illegible]——[illegible]——[illegible][7][illegible]—[illegible]4000[illegible]8.1[illegible]8.2[illegible]

[illegible]“[illegible]”[illegible][8][illegible][9][illegible]—[illegible]4000[illegible]·[illegible]Joseph Greenberg[illegible][10]


非洲—欧亚大陆世界区
美洲世界区
太平洋世界区
澳大利亚 /
巴布亚新几内亚世界区
农业起源的可能范围

[illegible]8.1 [illegible]


内陆欧亚区
欧洲
中亚
美索不达米亚
伊朗
埃及
苏丹
西非
印度次大陆
东南亚

[illegible]8.2 [illegible]—[illegible]

[illegible]

[illegible][11]

## [illegible]

[illegible]“[illegible]”[illegible]

### [illegible]

[illegible]——[illegible][12]

[illegible]——[illegible]

[illegible]

[illegible][13][illegible]·[illegible]Bruce Smith[illegible]

[illegible]“[illegible]”[illegible][14][illegible]

[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

[illegible]90%[illegible]

[illegible]8.2[illegible]

[illegible]——[illegible]

## [illegible]

[illegible]8.2[illegible]9000[illegible]5000[illegible]6000[illegible][15]

[illegible]8.2 [illegible]

| 时间（距今1000年） | 西南亚 | 中亚 / 东亚 | 非洲 | 美洲 |
| --- | --- | --- | --- | --- |
| 13—12 | | | | 狗 |
| 12—11 | 狗、山羊、绵羊 | | | |
| 11—10 | 二粒 / 单粒小麦、大麦、豌豆和绿豆、猪 | | | |
| 10—9 | 黑麦、牛 | | | 葫芦、南瓜 |
| 9—8 | 亚麻 | | | 胡椒、牛油果、豆 |
| 8—7 | 狐尾草、葫芦、狗 | | | 玉米、伊拉玛[2]/羊驼 |
| 7—6 | 枣椰、葡萄 | 荸荠、普通小麦、桑树、稻、水牛 | 龙爪粟 | |
| 6—5 | 橄榄、驴子 | 马、牛（瘤牛）、洋葱 | 油棕、高粱 | 棉花 |
| 5—4 | 甜瓜、韭葱、橡子 | 骆驼（大夏型） | 山药？豇豆 | 花生、甘薯 |
| 4—3 | 骆驼（单峰） | 大蒜 | 猫、珍珠、小米 | 豚鼠、木薯 |
| 3—2 | | | | 土豆、火鸡 |
| 2—1 | | | | 菠萝、烟草 |

[illegible]·[illegible]2[illegible]1998[illegible]136[illegible]

[illegible]·[illegible]Francis Galton[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible][16][illegible]

“[illegible]”[illegible]—[illegible]10[illegible]

[illegible]—[illegible]11000[illegible]9000[illegible]8[illegible]——[illegible]11500[illegible]10700[illegible][17][illegible]

[illegible][18][illegible]9300[illegible][19][illegible]17[illegible][20][illegible]

[illegible]9500[illegible]8800[illegible]8000[illegible]8000[illegible]

[illegible]6000[illegible]4000[illegible]4000[illegible]

[illegible]5500[illegible]Tehuacán[illegible]4000[illegible][21]

[illegible]

[illegible]4000[illegible]3000[illegible]1800[illegible]1100[illegible][22]

[illegible]9000[illegible]9000[illegible]6000[illegible]8000[illegible]“[illegible]”[illegible]

[illegible]

[illegible]

## [illegible]

### [illegible][23]

[illegible]“[illegible]”[illegible]

[illegible]20[illegible]·[illegible]“[illegible]……[illegible]”[24]

[illegible]（Mongongo）[25][illegible]

[illegible]6000[illegible]7000[illegible][26][illegible]

[illegible][27][illegible]—[illegible][28][illegible]——[illegible]——[illegible]——[illegible][29][illegible]50%[illegible]25—30[illegible]50—60[illegible][30][illegible]·[illegible]“[illegible]”[31]

[illegible]

## [illegible]“[illegible]”[illegible]

[illegible]20[illegible]20[illegible]N. I. [illegible]Vavilov[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]·[illegible]Robert Braidwood[illegible]——[illegible]

[illegible]·[illegible]（Karim Shahir）[illegible]（Jarmo）[illegible]·[illegible]（Richard MacNeish）[illegible]20[illegible]40[illegible][32]

[illegible][33]

[illegible]20[illegible]

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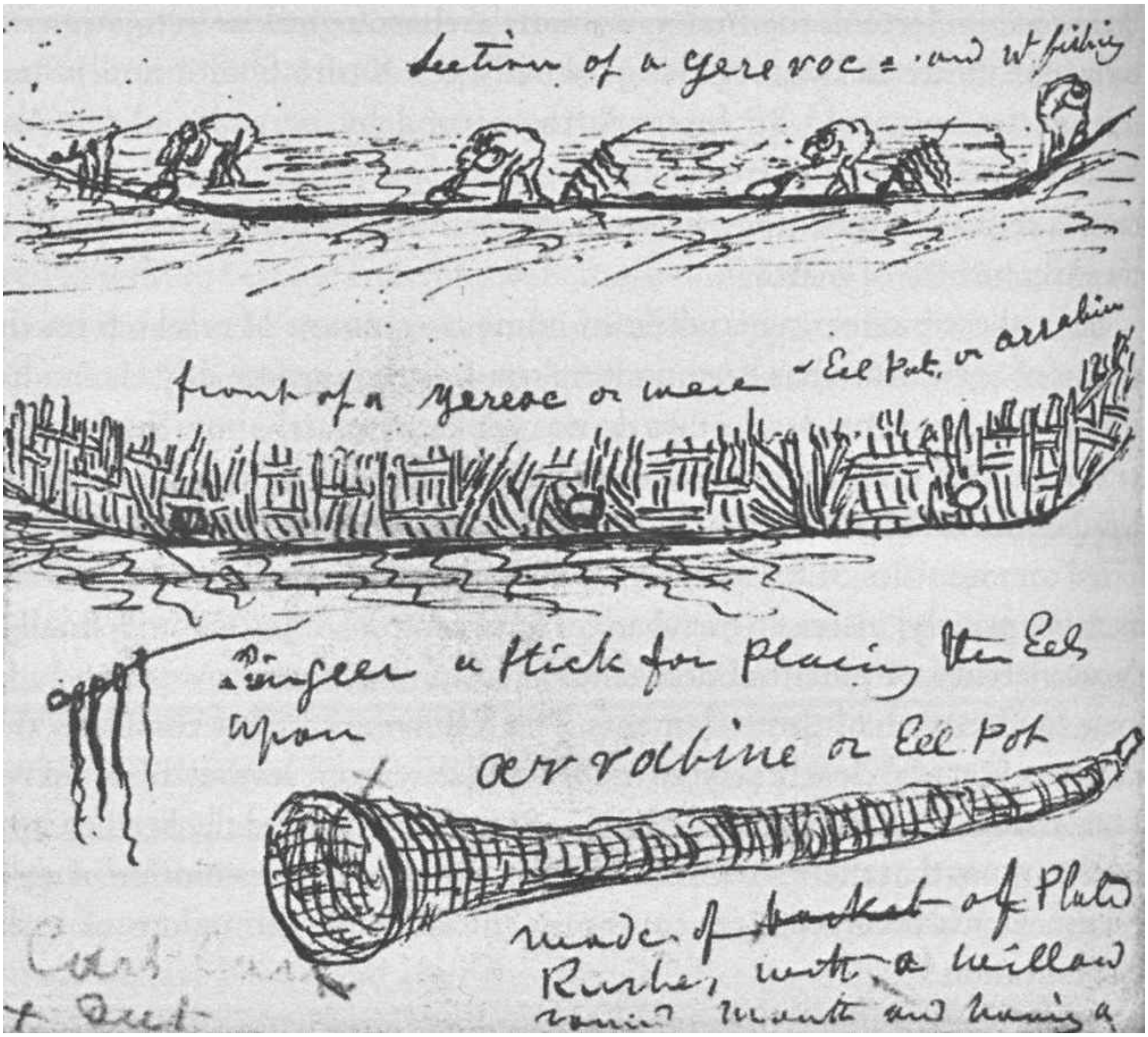
[illegible]“[illegible]”[illegible]1000[illegible]

[illegible]5000[illegible]“[illegible]”[illegible][36][illegible]4000[illegible][37]

[illegible]300[illegible]8.3[illegible]·[illegible]

[illegible]V[illegible][38]

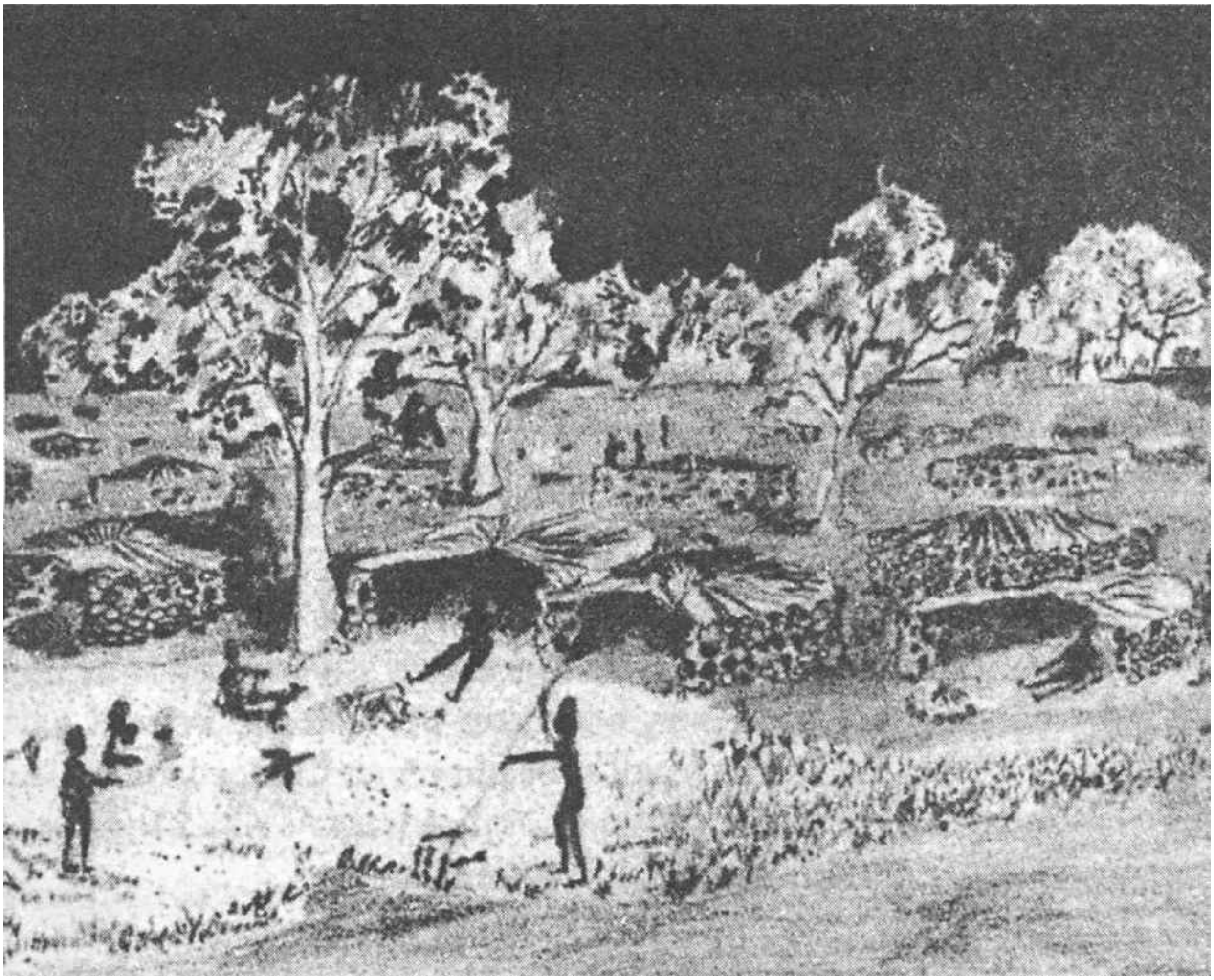
[illegible]8.4[illegible]146[illegible][39][illegible]




[illegible]**8.3** [illegible]

1814[illegible]·[illegible]·[illegible]“[illegible]yeroec[illegible]”[illegible]“[illegible]”[illegible]arrabine[illegible]“[illegible]lingeer[illegible]”[illegible]“[illegible]”[illegible]·[illegible]1983[illegible]206[illegible]·[illegible]·[illegible]George Augustus Robinson[illegible]1814[illegible]Mitchell[illegible]

[illegible]15 000[illegible][40]



**[illegible]8.4 [illegible]**

[illegible]Condah[illegible]140[illegible]·[illegible]1983[illegible]207[illegible]·[illegible]David White[illegible]29.1.81

[illegible]9 000—10 000[illegible]5000[illegible][41][illegible]·[illegible]

[illegible][42]

[illegible]100[illegible]3000[illegible]1500[illegible][43]

[illegible]18 000[illegible]15 000[illegible][44][illegible]14 000[illegible]2000[illegible]3000[illegible]·[illegible]Ain Malaha[illegible][45][illegible]150[illegible]

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[illegible]“[illegible]”[illegible][46][illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible][47][illegible]

·[48]

Jack Harlan 20 70

[illegible]“[illegible]”[illegible]

[illegible]·[illegible]Ester Poserup[illegible]·[illegible]“[illegible]”[illegible][49][illegible]—[illegible][50][illegible]·[illegible]Paul Bairoch[illegible]“[illegible]860[illegible]560[illegible]50[illegible][51]”

[illegible]8[illegible]9[illegible]

[illegible]19[illegible]

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[illegible]·[illegible]Andrew Sherratt[illegible]“[illegible]”[illegible]20[illegible]60[illegible]·[illegible]Jane Jacobs[illegible][53][illegible]

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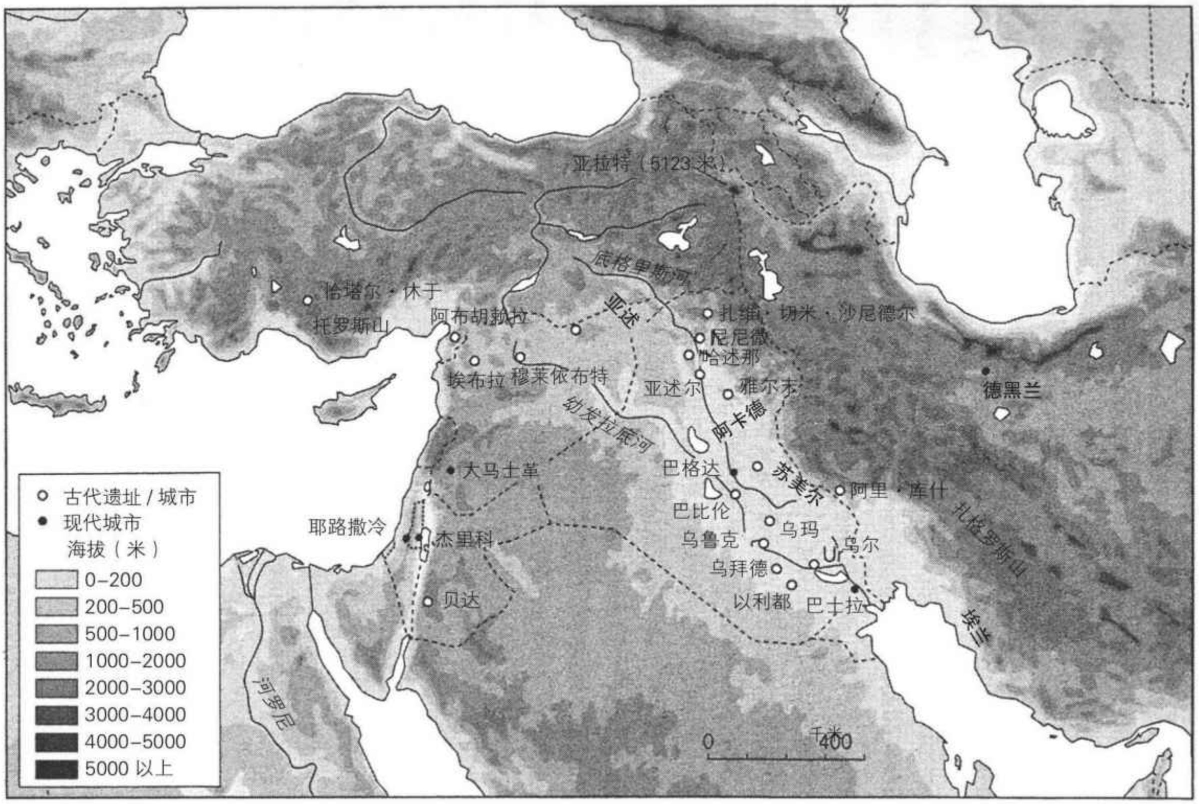
[illegible]10 500[illegible]Abu Hureyra[illegible][56][illegible]10 500[illegible]10 500[illegible]300—400[illegible]9700[illegible]9000[illegible][57][illegible]8.3[illegible]

## [illegible]

[illegible]——[illegible]——[illegible]

[illegible][58][illegible]·[illegible]

[illegible]——[illegible]——[illegible][59]


亚拉特（5123米）
底格里斯河
哈塔尔·休于
托罗斯山
阿布胡赖拉
亚述
扎维·切米·沙尼德尔
尼尼微
哈述那
埃布拉
穆莱依布特
亚述尔
雅尔木
幼发拉底河
阿卡德
德黑兰
大马士革
巴格达
苏美尔
阿里·库什
巴比伦
乌玛
耶路撒冷
杰里科
乌鲁克
Ur
乌尔
乌拜德
以利都
巴士拉
贝达
扎格罗斯山
伊兰
河罗尼
千米
0
400
古代遗址 / 城市
现代城市
海拔（米）
0–200
200–500
500–1000
1000–2000
2000–3000
3000–4000
4000–5000
5000 以上

[illegible]

[illegible]

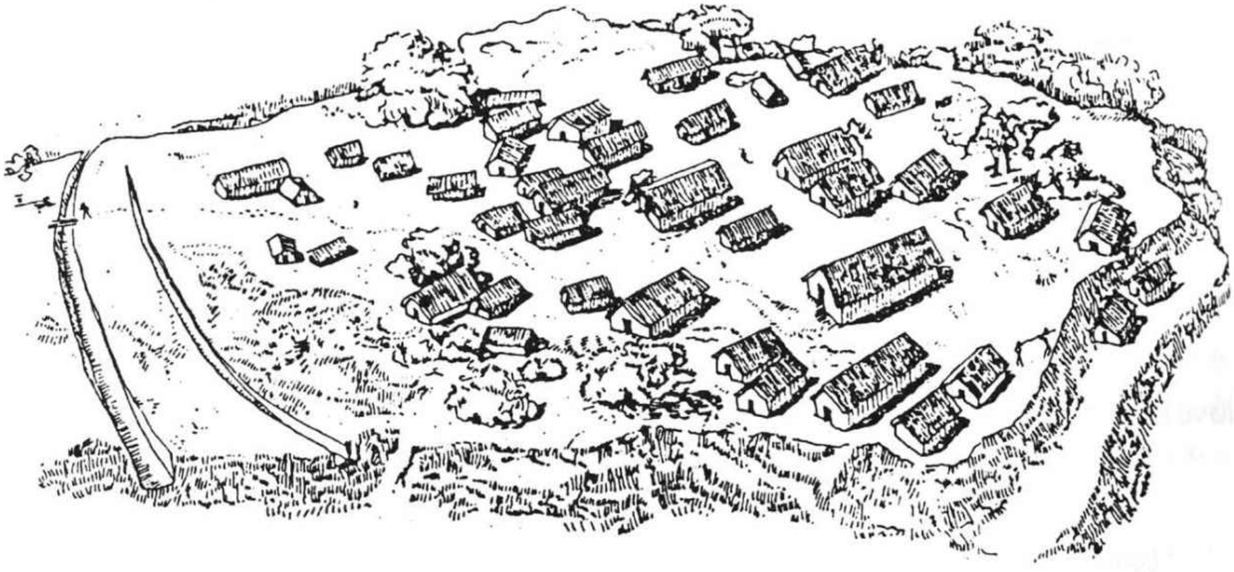
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[illegible]

[illegible]20[illegible]“[illegible]”[illegible]“[illegible]”[illegible]8.5[illegible]

[illegible]·[illegible]Elman Service[illegible]“[illegible]”[illegible]“[illegible]”[illegible]50[illegible]50[illegible][61][illegible]

[illegible]



[illegible]8.5 [illegible]

[illegible]Kolomiyshchina[illegible]·[illegible]Marija Gimbutas[illegible]·[illegible]Joan Marler[illegible]1991[illegible]106[illegible]

## [illegible]

[illegible]

Tripoplye · [62]

—— · —— ——

“ ”

—— —— [63] [64]

[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

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## [illegible]

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[illegible]

## [illegible]

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[1] [illegible]·R. [illegible]W. W. [illegible]2001[illegible]93[illegible]

[2] [illegible]·[illegible]Colin Renfrew[illegible]1989[illegible]125[illegible]·[illegible]——[illegible]26—27[illegible]

[3] J. R. [illegible]Biraben[illegible]4[illegible]1979[illegible]23[illegible]

[4] [illegible]·[illegible]2[illegible]1998[illegible]4[illegible]

[5] [illegible]·[illegible]2000[illegible]29[illegible]52[illegible]

[6] [illegible]·[illegible]Josephine Flood[illegible]1983[illegible]222—293[illegible]

[7] [illegible]·[illegible]John Kicza[illegible]“[illegible]1492[illegible]”[illegible]·[illegible]2001[illegible]190[illegible]813[illegible]

[8] □□□□□□□□□□□□□□□□236—237□□

[9] □□□·□□□Ben Finney□□□□□□□□□□□□□□□□□□□□□□□□5□□□2□□1994□□□□□273—298□□□□□□·R. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5□□□2□□1994□□□□□299—349□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1995□□□

[10] □□□·J. □□□□□□□□□□□□□□□3000□□□3□□□□□□□□□□□□□1990□□□□208□□□□□□□□□□·□□□□□□□□□□□·□□□Merritt Ruhlen□□□□□□□□□□□□□□□□□□□□□□□□□1992□11□□□94□□

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[29] [illegible]·[illegible]1989[illegible]112—113[illegible]132[illegible]139[illegible]

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[40] [illegible]226—228[illegible]

[41] [illegible]254—256[illegible]

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[43] P. M. [illegible]Dolukhanov[illegible]216[illegible]

[44] [illegible]·[illegible]Roland Oliver[illegible]2[illegible]2000[illegible]35[illegible]

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[51] [illegible]·[illegible]·[illegible]Christopher Braider[illegible]1988[illegible]7[illegible]·A. [illegible]Fekri A. Hassan[illegible]

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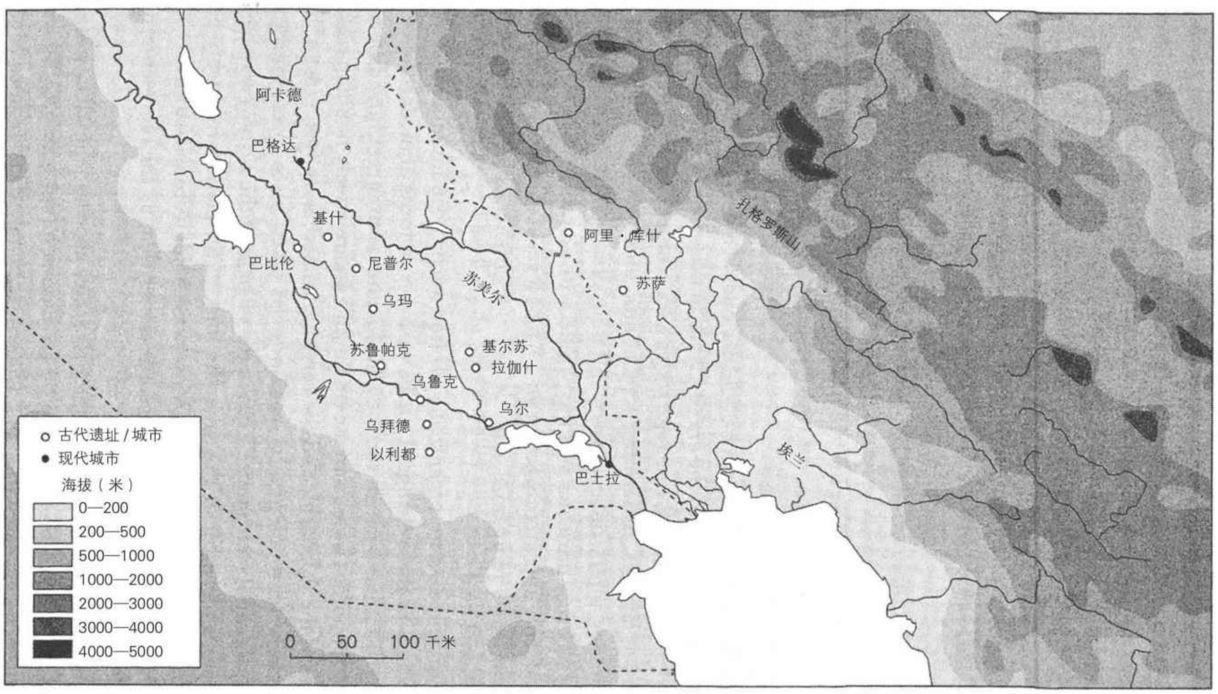
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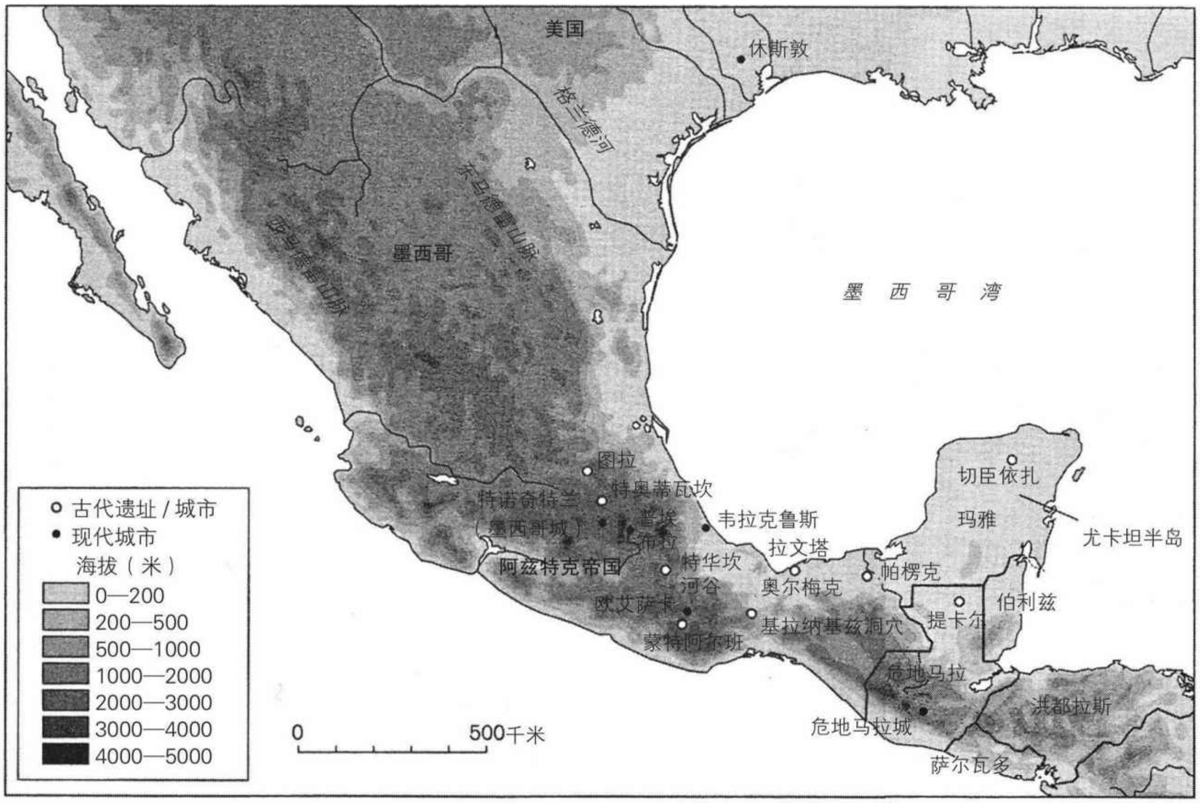
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苏鲁帕克
基尔苏
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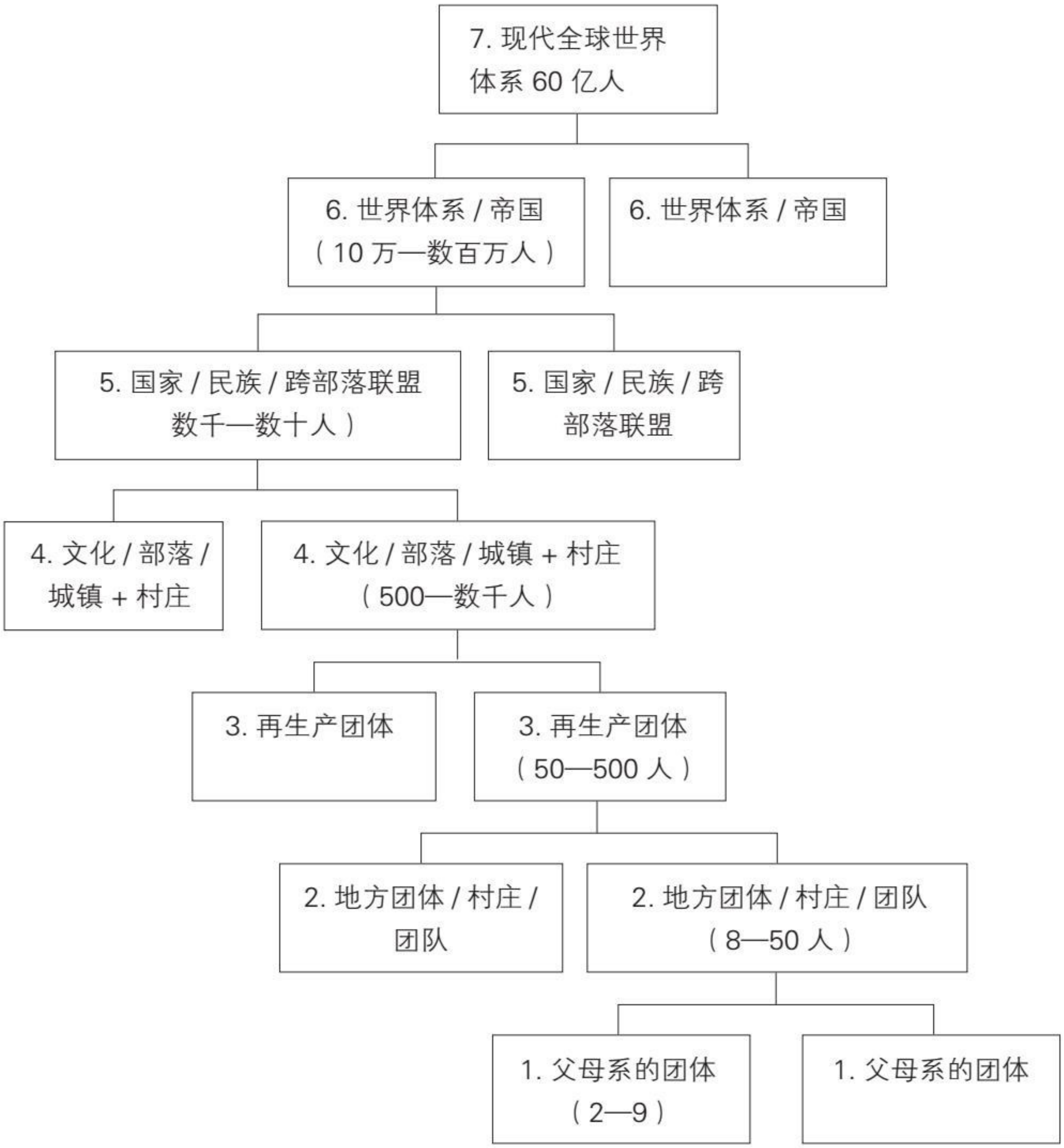



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| 层级 | 社会结构的类型与范围 | 规模 |
| --- | --- | --- |
| 7 | 现代全球化体系：涵盖全部以影响力、财富和权力组成等级形态的社会 | 60 亿 |
| 6 | 世界体系和帝国：涵盖文化上、经济上、有时政治上相互联系的大片地区 | 数十万到数百万 |
| 5 | 国家 / 民族 / 城市 / 跨氏族的组织：大型的、经济上和军事上强大的体系，数千 - 数十万以上具备国家的或者近似国家的结构 | 数千到数万 |
| 4 | 文化 / 部落 / 城镇和周边农村：相互联系的生产团体，有时有一个领袖，如“大人”或者“首领” | 500—数千 |
| 3 | 再生产团体 / 村庄群：相关的地方组织，其成员经常通婚，在稀疏的亲属和文化上有共同的意识 | 50—500 人 |
| 2 | 地方的或者独立的团体 / 村庄 / 团队 / 宿营团体：若干个父母系的团体，亲密地在一起生活、迁移 | 8—50 人 |
| 1 | 父母系的团体：父母和孩子，经常与父亲在一起，共同居住 | 2—8 人 |




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[illegible]congestion[illegible][4][illegible]

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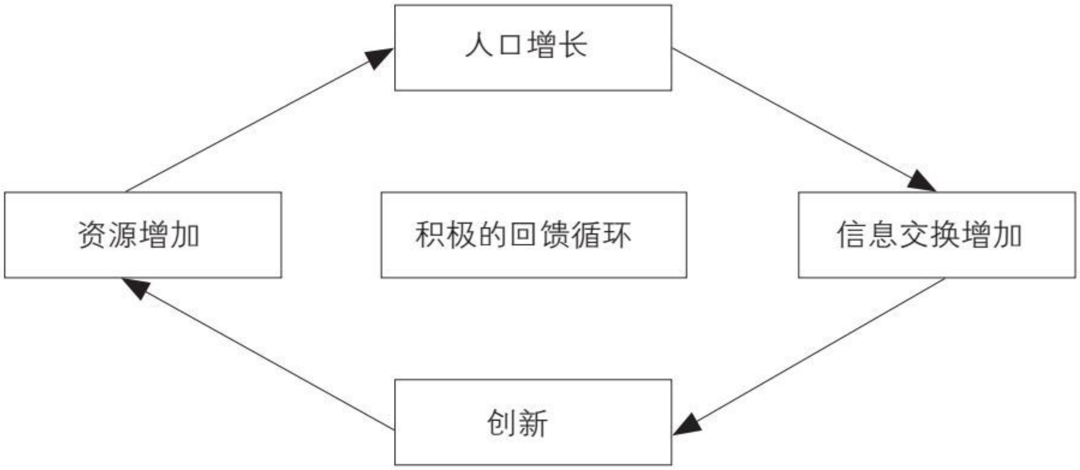
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人口增长
信息交换增加
创新
资源增加
积极的回馈循环

| | 能量投入（千兆焦耳／公顷） | 食物收获千兆焦耳／公顷） | 人口密度（千兆焦耳／公顷） |
|---|---|---|---|
| 采集 | 0.001 | 0.003—0.006 | 0.01—0.9 |
| 游牧社会 | 0.01 | 0.03—0.05 | 0.8—2.7 |
| 轮作 | 0.04—1.5 | 10.0—25 | 1—60 |
| 传统农业 | 0.5—2 | 10—35 | 100—950 |
| 现代农业 | 5—60 | 29—100 | 800—2000 |

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[illegible]·[illegible]John Goatsworth[illegible]“[illegible]……[illegible]1800[illegible]……[illegible]12.5[illegible]”[19]

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[illegible]“[illegible]”[illegible]big man[illegible]20[illegible]·[illegible]Bougainville[illegible]mumi[illegible]·[illegible]“[illegible]1939[illegible]1[illegible]10[illegible]1100[illegible]32[illegible]‘[illegible]’[illegible]”[25][illegible]

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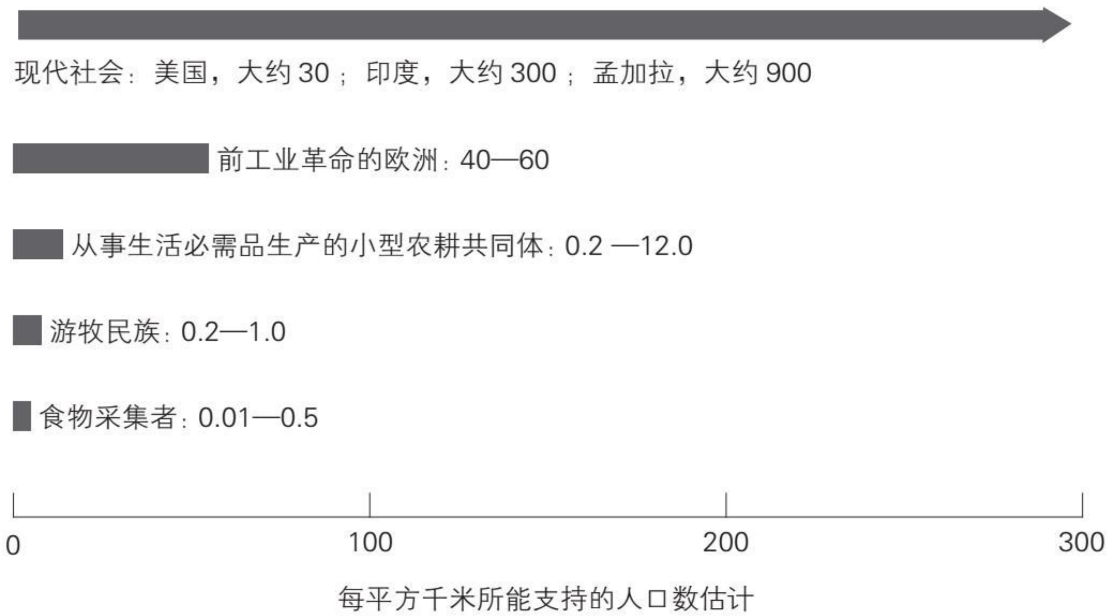
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[illegible]9.1[illegible]9.3[illegible]




[illegible]9.3 [illegible]

[illegible]·[illegible]——[illegible]1992[illegible]27[illegible]·[illegible]Carl Ipsen[illegible]·W. [illegible]·[illegible]2000[illegible]125[illegible]

[illegible][27][illegible]3500[illegible]“[illegible]”[illegible]

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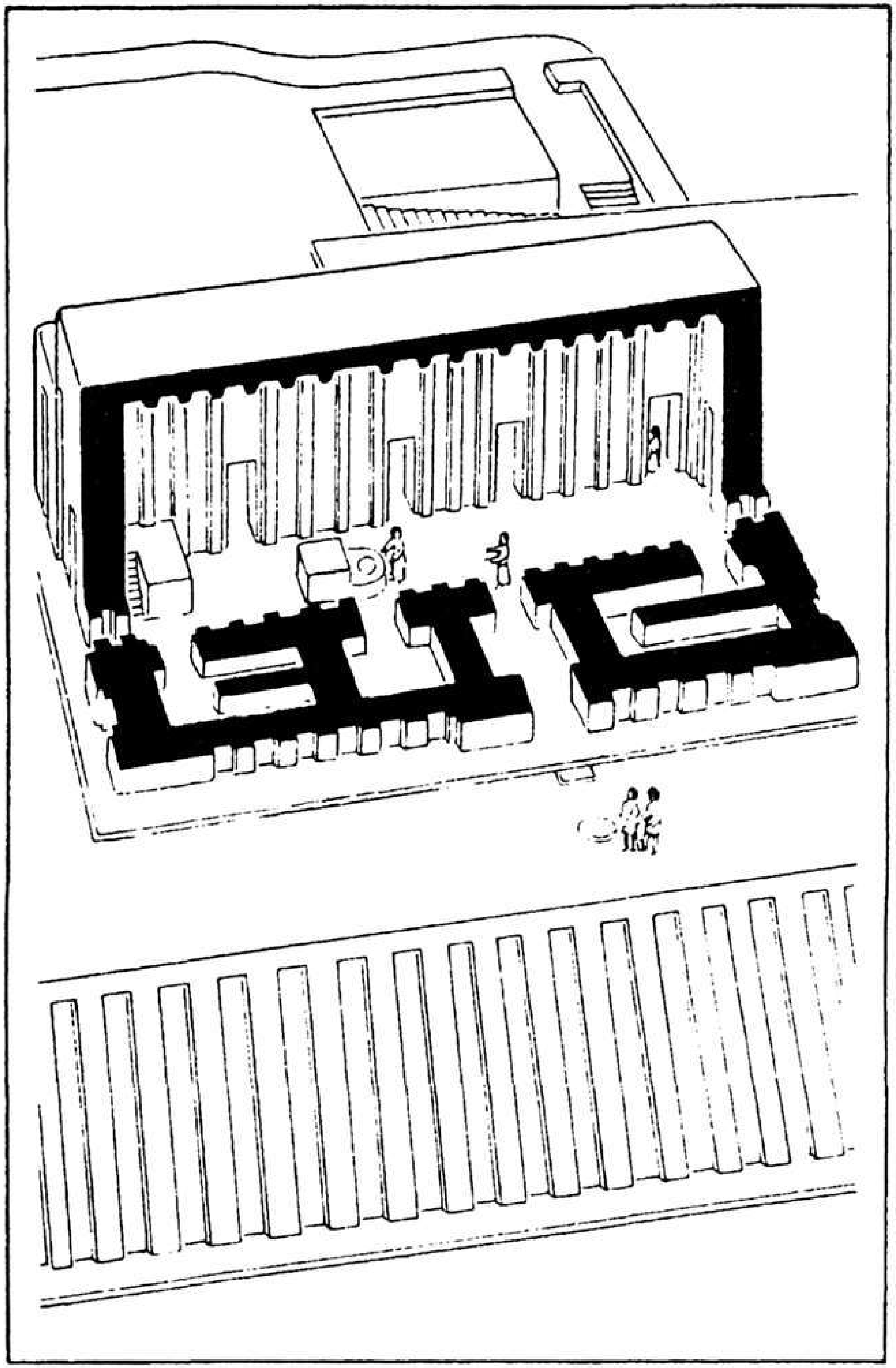
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[illegible]——[illegible]1[illegible]3000[illegible]5[illegible]12[illegible]“[illegible]”[illegible]9. 4[illegible]

[illegible]2900——[illegible]800[illegible]



[illegible]9.4 [illegible]“[illegible]”[illegible]

[illegible]A. [illegible]·[illegible]Bernard Knapp[illegible]1988[illegible]44[illegible]·[illegible]·[illegible]Helen and Richard Leacroft[illegible]1974[illegible]

[illegible]

[illegible]·[illegible][31][illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible][32][illegible][33]

[illegible]9. 1[illegible][34][illegible]“[illegible]”[illegible]

[illegible]·[illegible]Bunyoro[illegible]19[illegible]mukama[illegible][35][illegible]10[illegible]“[illegible]”[illegible]

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> [illegible]……[illegible][37]

[illegible]·[illegible]Constantine Porphyrogenitus[illegible]913—959[illegible]“[illegible]”[illegible]’druzhiny[illegible]

> [illegible]“[illegible]”[illegible]Vervians[illegible]Drugovichians[illegible]

[illegible]Krivichians[illegible]Sverians[illegible]

[illegible][38]

[illegible]10[illegible]·[illegible]“[illegible]”[39]

[illegible]·[illegible]“[illegible]”[40][illegible][41][illegible]·[illegible]“[illegible]‘[illegible]’[illegible]”[42][illegible][43]

[illegible]

2000 [44] —— ·Leonard Woolley —— [45]

3200 “ ”

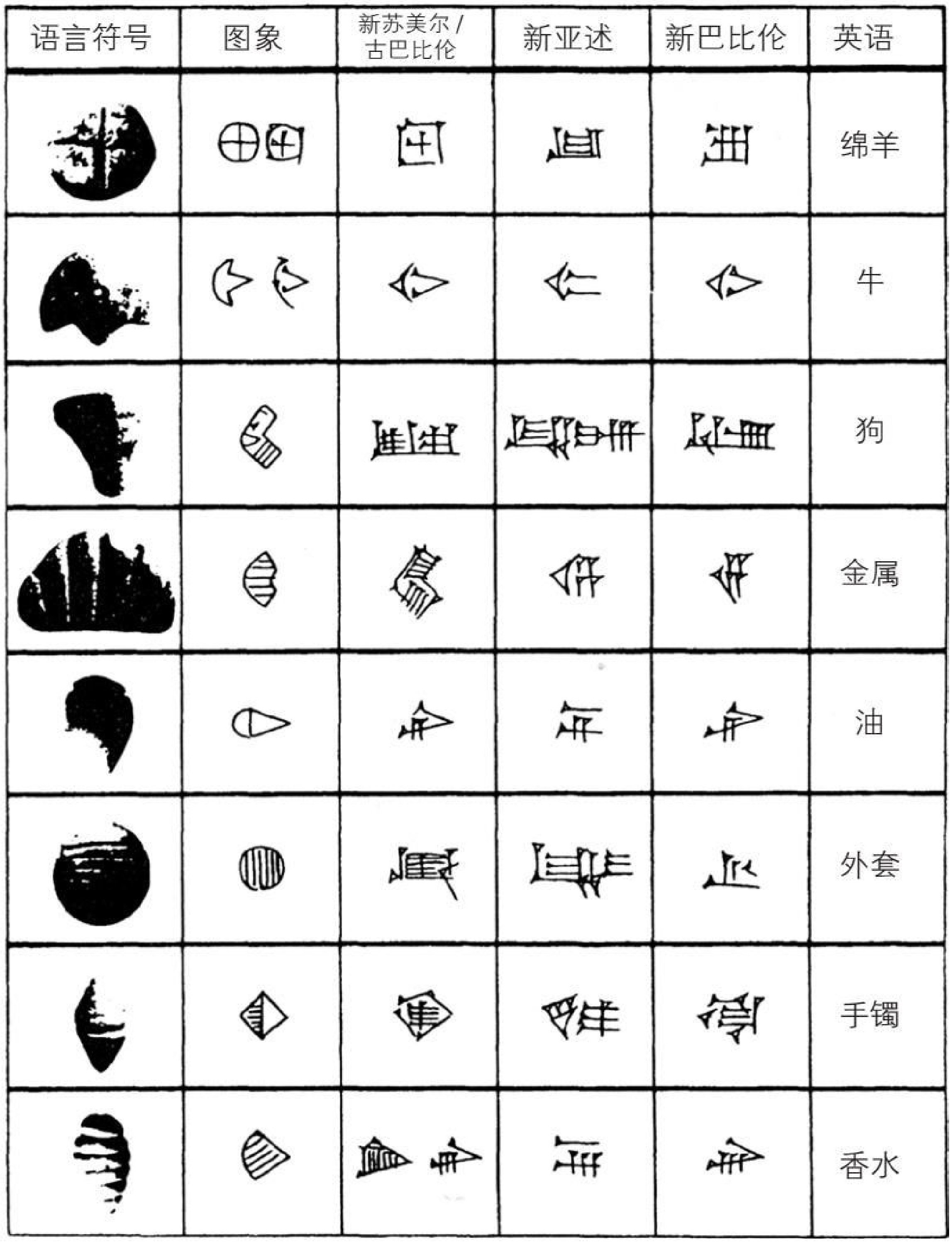
[46] [47]

[illegible]

[illegible]bullae[illegible]9.5[illegible]

[illegible]3000[illegible]“[illegible]”[illegible]ti[illegible]“[illegible]”[illegible]ti[illegible]“[illegible]”[illegible]

[illegible]3100[illegible]2500[illegible]1200[illegible]




**[illegible]9.5 [illegible]**

[illegible]A.[illegible]·[illegible]Bernard Knapp[illegible]1988[illegible]55[illegible]

[illegible]

[illegible]600[illegible]quipu[illegible]——[illegible]

[illegible]Umma[illegible]Girsu[illegible]Lagash[illegible][48][illegible]·[illegible][49]

## “[illegible]”[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]9. 3[illegible]“[illegible]”[illegible]·[illegible]“[illegible]‘[illegible]’[illegible]”[50]

**[illegible]9.3 [illegible]**

| 技术／生活方式 | 生产方式 | 特征 | 流行时代 |
|---|---|---|---|
| 采集社会 | 亲属制度 | 旧石器时代的主要技术使用石制工具，以采集植物为其生活方式；规模小（其组织程度仅及第3层，* 但是在某些区域性的文化和跨部落体系中有第4层的某些特征 | 旧石器时代：全世界距今大约10 000年；某些地区至今尚存 |
| 农业社会（早期农业社会） | 亲属制度 | 农业时代的主要技术基于种植和畜牧；养活小规模的、前国家社会（达到第4层）；和…… | 农业时代：距今约10000早期农业时代：距今约5000年前，某些地区至今尚存 |
| 农业社会（农耕文明） | 收取贡赋 | 大型社会，组织形式为城市和国家（达到第6层）；人口增速加快，但周期性发生人口危机；新石器时代典型的生活方式为游牧文化 | 后农业时代：距今大约5000—200年；某些地区出现甚晚 |
| 现代社会 | 资本主义 | 现代主要技术为现代科学；能够支持全球体系（第7层）；前所未有的人口增长 | 现代：始于大约公元1750年 |

* [illegible]9.1[illegible]9.1[illegible]

[illegible]—[illegible]

[illegible]2000[illegible]2500[illegible][51][illegible]

[illegible]

[illegible]La Venta and San Lorenzo[illegible]33[illegible]80[illegible]18 000[illegible][52][illegible]80[illegible][53][illegible]

[illegible]500[illegible]Oaxaca[illegible]1300[illegible]1000[illegible]600[illegible]Monte Alban[illegible]400[illegible]7[illegible]4000[illegible]200[illegible]12[illegible]200[illegible]——700[illegible]17 000[illegible][54]

[illegible]2000[illegible]——[illegible]

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[illegible]“[illegible]”[illegible]

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[illegible]·[illegible]1988[illegible]·[illegible]·[illegible]（Göran Burenhult[illegible]3[illegible]4[illegible]1994[illegible]·[illegible]4[illegible]1994[illegible]·[illegible]3[illegible]1990[illegible]·[illegible]（Charles Maisels[illegible]1990[illegible]·[illegible]1993[illegible]·[illegible]1971[illegible]2[illegible]·[illegible]Robert Cohen[illegible]·[illegible]1978[illegible]·[illegible]·[illegible]2000[illegible]2[illegible]·[illegible]1983[illegible]·[illegible]1989[illegible]·[illegible]Anatoly Khazanov[illegible]1994[illegible]2[illegible]·[illegible]1993[illegible]·[illegible]Peter Golden[illegible]2001[illegible]D. T. [illegible]1997[illegible]

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[1] [illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible]2[illegible]——[illegible]7[illegible]

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[3] [illegible]·W. [illegible]·[illegible]2000[illegible]32[illegible]36[illegible]·M. [illegible]10[illegible]·[illegible]2001[illegible]368—385[illegible]

[4] [illegible]“[illegible]”[illegible]2[illegible]

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[18] [illegible]·J. [illegible]3000[illegible]3[illegible]1990[illegible]336[illegible]

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□□□□□□□2001□□244—245□

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[36] □□·□□Valeri Hansen□□□□□□1600□□□□□□□□W. W. □□2000□□□
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994—996□□□

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[52] □□□·D. □□□Michael D. Coe□□□□□□□□□□□□□□□□□□□□□□□4□□□□□□□□□□□□□□□1944□□71□□

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# [illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[1]

[illegible]4000[illegible]

## [illegible]

[illegible]

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[illegible]“[illegible]”[illegible]“[illegible]”[illegible]3500[illegible]Lapita[illegible]300[illegible]500[illegible]Aotearoa[illegible]800[illegible]1000—1200[illegible][3][illegible]·[illegible]

[illegible]30 000—40 000[illegible][4]

[illegible]—[illegible]—[illegible]13[illegible]

[illegible]—[illegible][5][illegible]

[illegible]500[illegible]50[illegible]5000[illegible]13[illegible]

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[illegible]——[illegible][6][illegible]——[illegible]“[illegible]”（Shah of Shahs）.

[illegible]

[illegible]·[illegible]“[illegible]”[illegible][7][illegible]

[illegible]——[illegible]9[illegible]·[illegible]——[illegible]——[illegible]“[illegible]”。[8]

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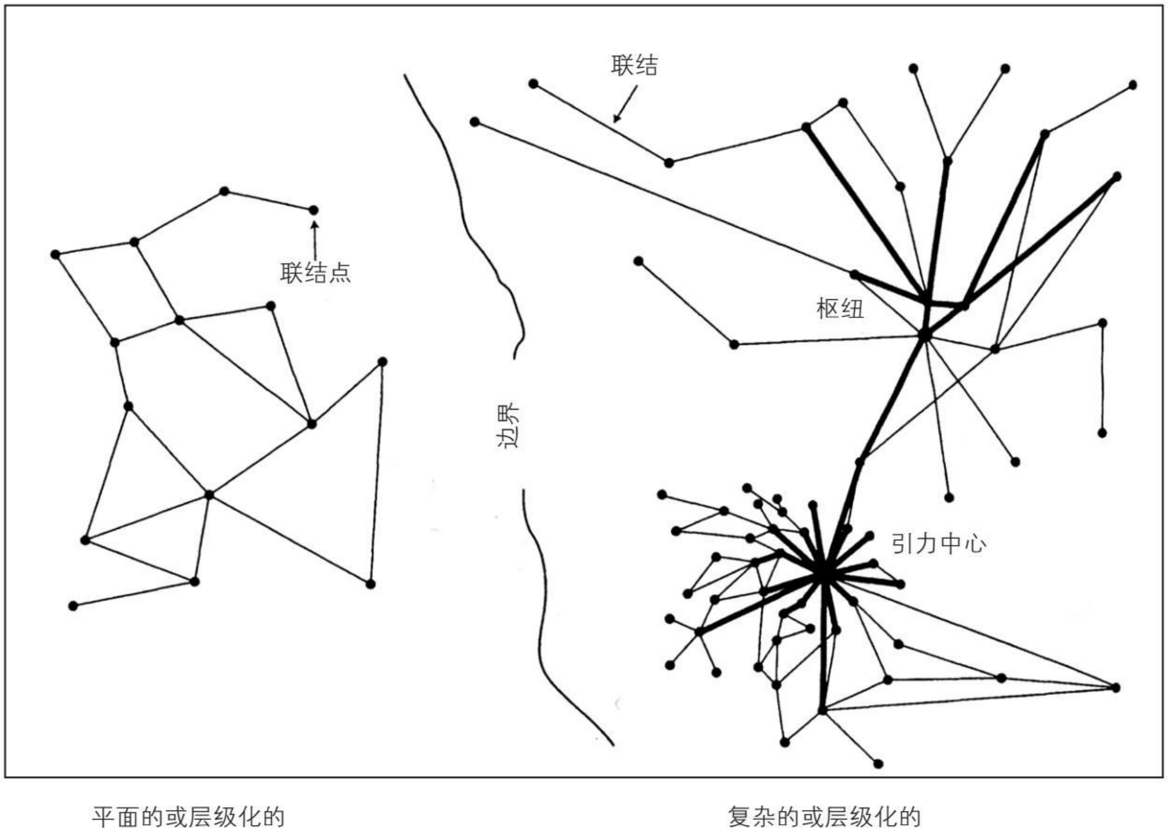
Janet Abu-Lughod 13 Andre Gunder Frank Barry Gills [10] Christopher Chase-Dunn Thomas D. Hall [11]

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[illegible]10.1 [illegible]

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[illegible]

# [illegible]

## [illegible]

[illegible]3000[illegible]4000[illegible]1000[illegible]1/5[illegible]—[illegible]10.1[illegible]

[illegible]4000[illegible]

[illegible]10.1 [illegible]

| 日期 | 事件 |
|---|---|
| 约公元前 3200 年 | 苏美尔最早的国家 |
| 约公元前 3000 年 | 埃及最早的国家 |
| 约公元前 2500 年 | 北印度／巴基斯坦最早的国家（公元前第二个千年消亡） |
| 约公元前 2200 年 | 美索不达米亚最早的区域性国家／帝国 |
| 约公元前 2000 年 | 中国北方（黄河流域）最早的国家 |
| 约公元前 1000 年 | 北印度／恒河国家复兴 |
| 约公元前 500 年 | 东南亚最早的国家 |
| 约公元前 500 年 | 波斯的“第二帝国” |
| 约公元前 500 年 | 美索不达米亚最早的国家 |
| 约公元前 500 年 | 美索不达米亚最早的区域国家／帝国 |
| 约公元 600 年 | 撒哈拉以南非洲最早的国家 |
| 约公元 1400 年 | 中美洲／南美洲最早的国家 |

[illegible]3000[illegible]2000[illegible]Yam[illegible]Kerma[illegible]2350[illegible]50[illegible][13][illegible]5400[illegible][14][illegible]ensis[illegible]

[illegible]2000[illegible]Agade[illegible]

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[illegible]2000[illegible][16][illegible]

[illegible]20[illegible][17][illegible]1792[illegible]282[illegible]49[illegible]10.2[illegible]

[illegible]—[illegible]—[illegible]—[illegible]500[illegible]—[illegible]



[illegible][18][illegible]2000[illegible]——[illegible]——[illegible]4000[illegible]2000[illegible]—[illegible][19][illegible]

[illegible]—[illegible]10[illegible]7[illegible]6[illegible]——[illegible]—[illegible]

[illegible]334——[illegible]323[illegible]—[illegible]241[illegible]264——[illegible]146[illegible]4[illegible]

[illegible]320——[illegible]185[illegible]268——[illegible]233[illegible]

[illegible]·[illegible]Lynda Shaffer[illegible]“[illegible]”[illegible][20]

[illegible]6[illegible]1[illegible]—[illegible]Kush[illegible]712——[illegible]664[illegible]

[illegible]—[illegible]——[illegible]—[illegible][21][illegible]

[illegible]3[illegible][22][illegible]6[illegible]3[illegible]Tuareg[illegible]9[illegible]Wagadu[illegible]

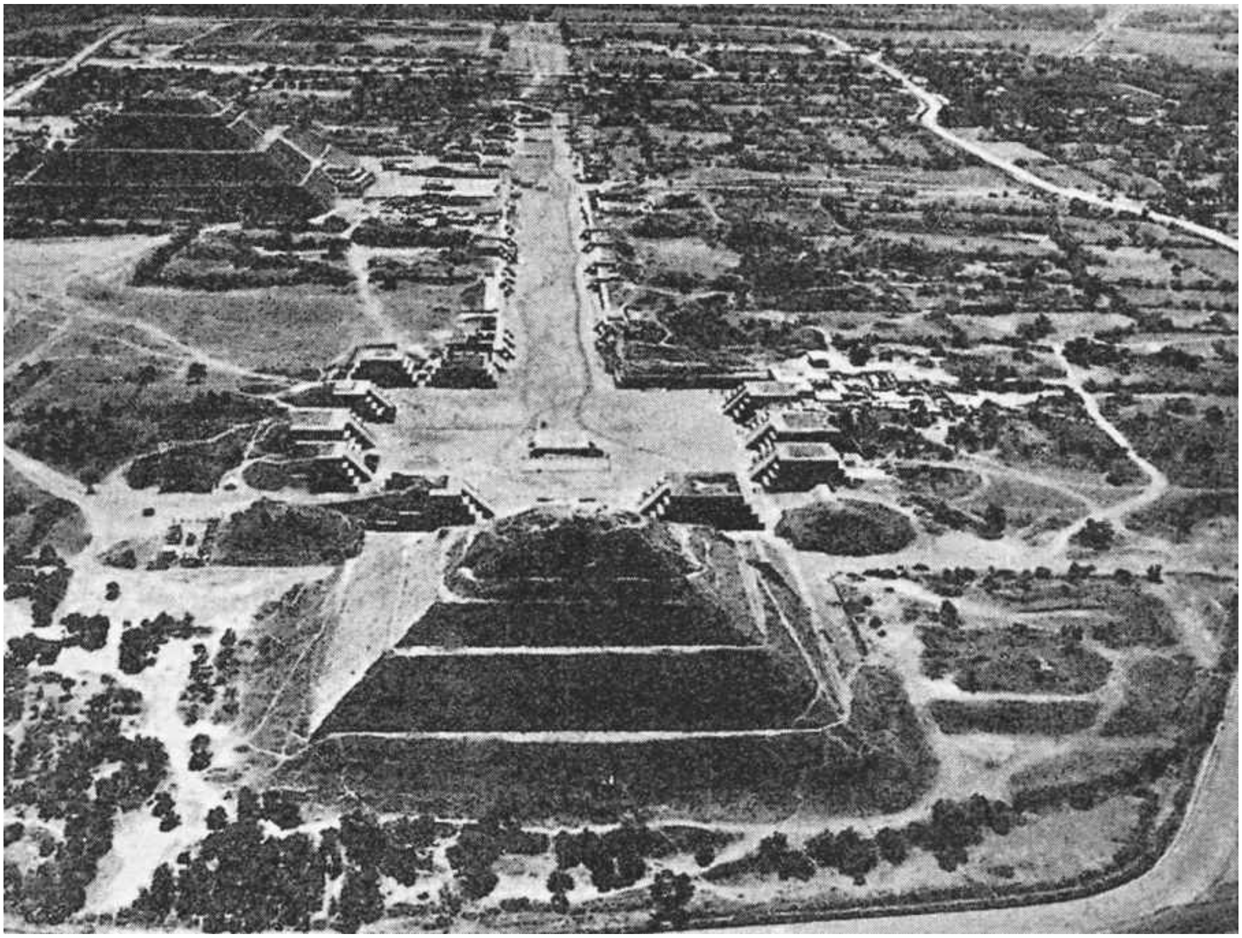
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[illegible]——[illegible]1[illegible]3/4[illegible]1300[illegible]1/4[illegible]

[illegible][23][illegible]10[illegible]988[illegible]9[illegible]

[illegible]1000[illegible]16[illegible][24][illegible]Teotihuacán[illegible]50[illegible]500[illegible]150[illegible]6[illegible]——8[illegible]——[illegible]6000[illegible]·[illegible]

——[illegible]500[illegible]10[illegible]——20[illegible]10.3[illegible][25][illegible]chinampa[illegible]50[illegible]“[illegible]”[illegible][26][illegible]



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[illegible]40[illegible]200—650[illegible]20[illegible]·M. [illegible]7[illegible]·[illegible]1992[illegible]574[illegible]·[illegible]René Millon[illegible]1[illegible]1973[illegible]·[illegible]

[illegible]15[illegible]Tenochtitlán[illegible]20[illegible]——30[illegible]Cortés[illegible]·[illegible]·[illegible]·[illegible]Bernal Díaz del Castillo[illegible]1519[illegible]

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1500[illegible]200[illegible]“[illegible]”[illegible]7[illegible][29]

[illegible]15[illegible]30[illegible]Chaokia[illegible]1200[illegible]3[illegible]——4[illegible]

[illegible]—[illegible]—[illegible]16[illegible]

[illegible]

[illegible]4000[illegible]·[illegible]Rein Taagepera[illegible]—[illegible]“[illegible]”[illegible]—[illegible]10.2[illegible]

[illegible]10.2 [illegible]—[illegible]

| 时代 | 日期 | 控制的地区以 100 万平方千米计 | 占今国家面积的百分比 |
|---|---|---|---|
| 后期农耕 1 | 公元前第三个千年 | 0.15（均在西南亚） | 0.2 |
| | 公元前第二个千年中叶至公元前第一个千年 | 1—2.5 | 0.75—2.0 |
| 后期农耕 2 | 约公元前 6 世纪 | 8 | 6.0 |
| | 约公元前 1 世纪 | 16 | |
| | 公元 1000 年 | 16 | |
| 后期农耕 3 | 约公元 13 世纪 | 33（主要为蒙古帝国） | 25.0 |
| | 约公元 17 世纪 | 44（此时计入美洲） | 33.0 |
| 现代 | 20 世纪 | 大约 130 | 100.0 |

[illegible]·[illegible]·K. [illegible]Stephen K. Sanderson[illegible]·[illegible]1995[illegible]79—82[illegible]·[illegible]7[illegible]1978[illegible]108—127[illegible]

[illegible]—[illegible]2%[illegible]1000[illegible]6%——13%[illegible]—[illegible]

[illegible]500[illegible]1000[illegible]1000[illegible]1500[illegible]20[illegible]2.2[illegible][30]

[illegible]17[illegible]300[illegible]20[illegible]1/3[illegible]

[illegible]

[illegible]

[illegible]

[illegible]—[illegible]—[illegible]

[illegible]10.3[illegible]10.4[illegible]—[illegible]4000[illegible]

[illegible]

[illegible]10.3 [illegible]

| 时代 | 近似日期 | 载人和货物的方式 |
| --- | --- | --- |
| 旧石器时代 | 距今大约 70 万年前 | 最早的人亚科原人在非洲迁移 |
| | 距今大约 10 万年前 | 现代人出现在欧亚大陆；最早的现代人迁移出非洲 |
| | 距今大约公元前 6 万年前 | 最早渡海移居澳大拉西亚；最早的海船 |
| 农耕时代 | 大约公元前 4000 年前 | 畜力运输工具 |
| | 大约公元前 3500 年前 | 轮式运输工具 |
| | 大约公元前 1500 年前 | 波利尼西亚长途海运 |
| 近代 | 公元第一个千年 | 造船航海技术改进 |
| | 大约 19 世纪早期 | 火车和轮船 |
| | 大约 19 世纪晚期 | 内燃机 |
| | 大约 20 世纪早期 | 空中旅行 |
| | 大约 20 世纪中期 | 太空旅行 |

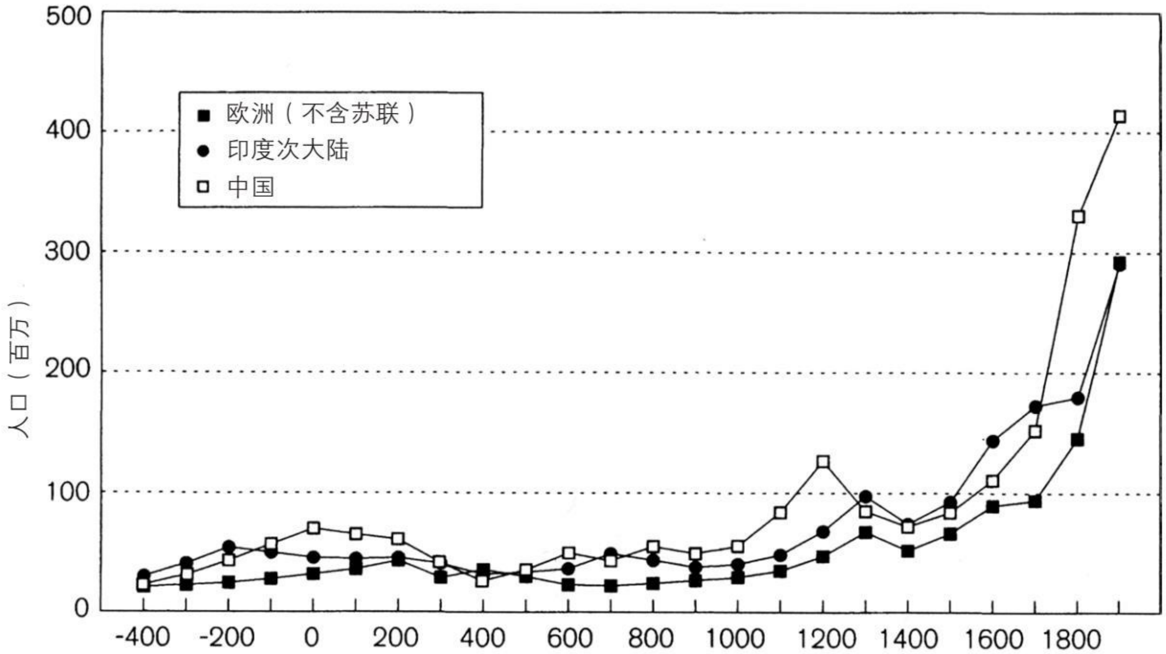
[illegible]10.4 [illegible]

| 时代 | 近似日期 | 信息运动方式 |
|---|---|---|
| 旧石器时代 | 旧石器时代，人类历史的开端 | 现代语言形式；不同群体之间分享信息 |
| | 旧石器时代晚期 | 洞穴画 |
| | 旧石器时代晚期以来? | 用鼓、灯塔、烟等信号进行远距离交流 |
| 农耕时代 | 大约公元前 3000 年 | 作为固定信息的文字 |
| | 大约公元前 2000 年 | 字母文字 |
| | 农耕文明时代 | 政府资助的或军事的通信系统 |
| | 大约公元 8 世纪以来 | 木版印刷 |
| 近代 | 大约公元 16 世纪 | 全球世界体系；世界交通和运输体系 |
| | 大约 18 和 19 世纪 | 印刷用于大众交流：报纸、邮政服务 |
| | 19 世纪 30 年代 | 电报 |
| | 19 世纪 80 年代后期 | 电话 |
| | 20 世纪 | 电子化大众媒体：无线电、电影、电视 |
| | 20 世纪晚期 | 因特网、即时全球信息交流 |

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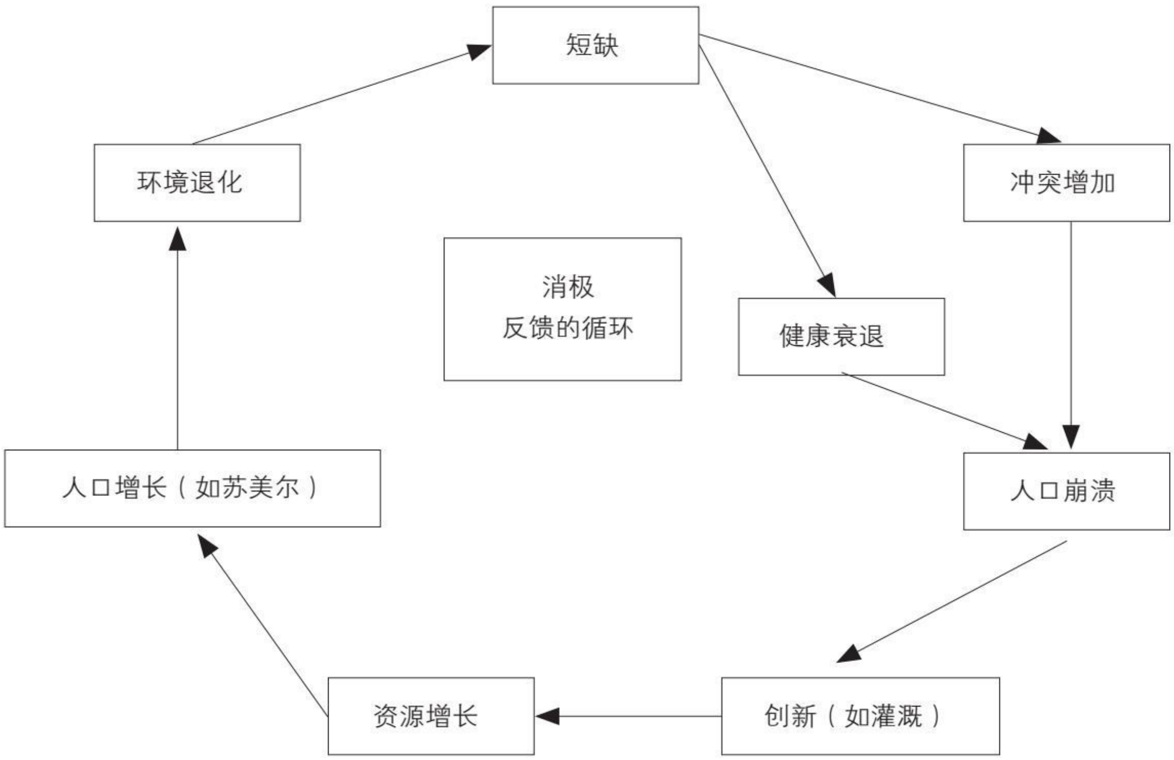
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[illegible]3000[illegible]1[illegible]5000[illegible]2.5[illegible]6.2[illegible]6.3[illegible]——[illegible]1966[illegible]·[illegible]（Emmanuel Le Roy Ladurie[illegible]·[illegible]Robert Lopez[illegible]“[illegible]”[illegible]“[illegible]”[31][illegible]“[illegible]”[illegible][32][illegible][33][illegible]




**[illegible]10.4 [illegible]400——[illegible]1900[illegible] J. R. [illegible]34[illegible]1997[illegible]16[illegible]**

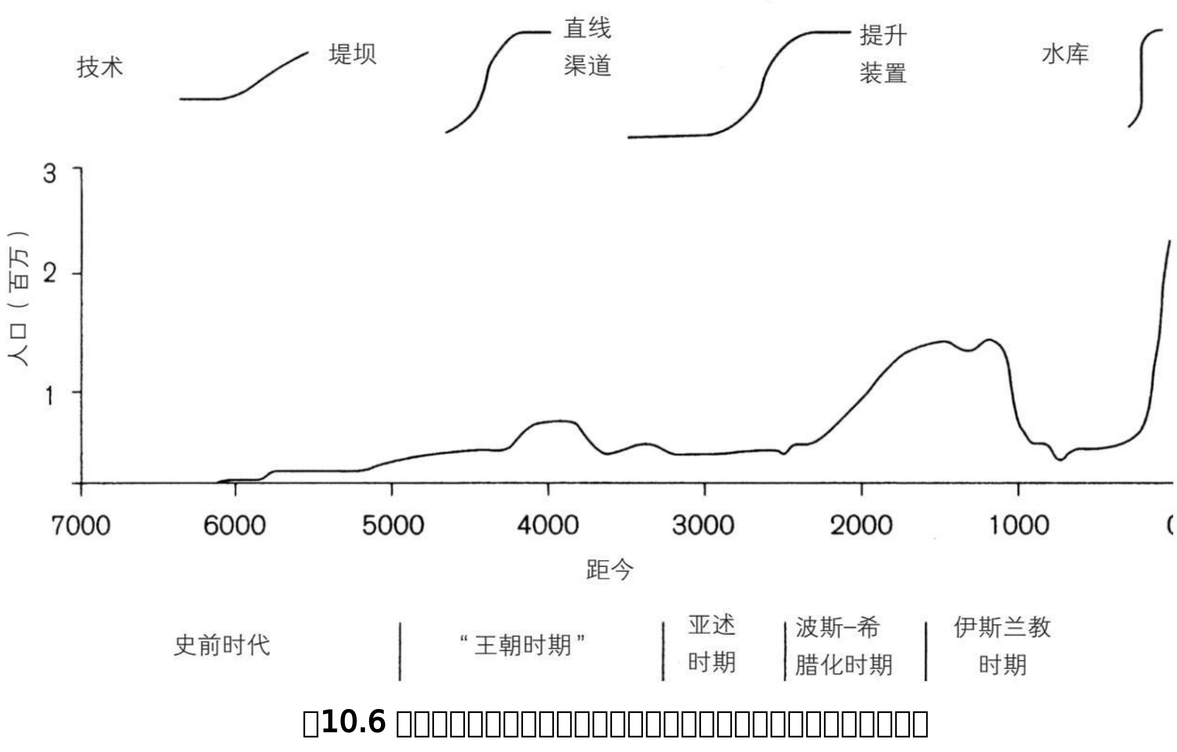
[illegible]·[illegible]10.4[illegible]J. R. [illegible]400——[illegible]1900[illegible][34][illegible]——[illegible]10.5[illegible]



短缺
环境退化
冲突增加
消极
反馈的循环
健康衰退
人口增长（如苏美尔）
人口崩溃
资源增长
创新（如灌溉）

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□**10.6** □□□□□□□□□□□□□□□□□□□□□□□□

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[illegible]·[illegible]“[illegible]”[illegible][37][illegible]

[illegible]——[illegible]·[illegible][38][illegible]6.3[illegible]1000——[illegible]1[illegible]3000——[illegible]1000[illegible]1630[illegible]1580[illegible]1000[illegible]——[illegible]1[illegible]945[illegible]—[illegible]

[illegible]·[illegible]“[illegible]”[illegible]

> [illegible][39]

[illegible]

[illegible]1000[illegible]

[illegible]“[illegible]”[40]



北美洲
洛基山脉
霍普韦尔
印第安人
大西洋
奥尔梅克
阿兹特克帝国
墨西哥城
玛雅
亚马孙
盆地
太平洋
印加
利马
南美洲
安第斯山脉

### [illegible]10.1 [illegible]

[illegible]

[illegible]——[illegible]320—535[illegible]“[illegible]……[illegible]”[41][illegible]

[illegible]2[illegible]220[illegible]618[illegible][42][illegible]14[illegible]

[illegible]

[illegible]

[illegible][43][illegible]

[44] 10.5

**10.5**

| 时代 | 日期 | 国家或者帝国 | 控制地域面积（100万平方千米） |
|---|---|---|---|
| 农业时代晚期1 | 公元前第三个千年晚期 | 阿卡德的萨尔贡，美索不达米亚南部 | 0.6 |
| | 公元前第三个千年晚期 | 埃及 | 0.4 |
| | 公元前第二个千年晚期 | 埃及图特摩斯三世（公元前1490—1463） | 1.0 |
| | 公元前第二个千年晚期 | 中国商朝 | 1.0 |
| 农业时代晚期2 | 公元前第一个千年中期 | 伊朗阿黑门尼德王朝（及其继承者） | 5.5 |
| | 公元前第一个千年后期 | 印度孔雀王朝 | 3.0 |
| | 公元前第一个千年后期 | 中国汉朝 | 6.0 |
| | 公元第一个千年早期 | 地中海罗马帝国 | 4.0 |
| | 公元第一个千年中期 | 早期伊斯兰帝国 | 10.0 |
| | 公元第一千年后期 | 内陆欧亚大陆第一突厥帝国 | 7.5 |
| 农业时代晚期3 | 公元第二千年中—早期 | 内陆欧亚大陆蒙古帝国 | 25.0 |
| 近代 | 大约公元1500年 | 美洲印加和阿兹特克帝国 | 2.2 |

· 7 1978 108—127

[illegible]3000——[illegible]600[illegible]1[illegible]1[illegible]100[illegible]0.6[illegible]0.4[illegible]1[illegible]13[illegible]12[illegible]

[illegible]5.5[illegible]200[illegible]3[illegible]3[illegible]16[illegible]1[illegible]6[illegible]1[illegible]4[illegible]7[illegible]8[illegible]10[illegible]—[illegible]

[illegible]13[illegible]25[illegible]17[illegible]25[illegible]5—10[illegible]

[illegible]2000[illegible]1500[illegible]2[illegible]0.22[illegible][45]

[illegible][46][illegible]——[illegible]Naram-Sin[illegible]2250——[illegible]2220[illegible]

[illegible]—[illegible]·[illegible]1949[illegible]“[illegible]”[illegible][47][illegible]—[illegible]

[illegible]17[illegible]“[illegible]”[48][illegible]

[illegible]

[illegible]“[illegible]100[illegible]1800[illegible]”[49][illegible]1000[illegible]

[illegible]

[illegible][50][illegible]·[illegible]Moses Finley[illegible]“[illegible]”[51][illegible]

[illegible]“[illegible]”[illegible]

[illegible]

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> [illegible]……[illegible]

[illegible]

> [illegible][53]

[illegible]·[illegible]（Nizam al-Mulk）[illegible]“[illegible]”[illegible]12[illegible]“[illegible]‘[illegible]’[illegible]‘[illegible]’[illegible]……[illegible]”[54]

[illegible]——[illegible]221——[illegible]207[illegible]——[illegible]

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**□10.6 □□—□□□□□□□□□□**

| 时期 | 城市数量 | 最大城市规模 | 最大城市总人口 |
| --- | --- | --- | --- |
| 公元前 2250 年 | 8 | 约 30 000 | 240 000 |
| 公元前 1600 年 | 13 | 24 000—100 000 | 459 000 |
| 公元前 1200 年 | 16 | 24 000—50 000 | 499 000 |
| 公元前 650 年 | 20 | 30 000—120 000 | 894 000 |
| 公元前 430 年 | 51 | 30 000—200 000 | 2 877 000 |
| 公元 100 年 | 75 | 30 000—450 000 | 5 181 000 |
| 公元 500 年 | 47 | 40 000—400 000 | 3 892 000 |
| 公元 800 年 | 56 | 40 000—700 000 | 5 237 000 |
| 公元 1000 年 | 70 | 40 000—450 000 | 5 629 000 |
| 公元 1300 年 | 75 | 40 000—432 000 | 6 224 000 |
| 公元 1500 | 75 | 45 000—672 000 | 7 454 000 |

[illegible]·K. [illegible]1995[illegible]267[illegible]·[illegible]Tertius Chandler[illegible]4000[illegible]1987[illegible]460—478[illegible]

[illegible][59][illegible]·[illegible]“[illegible]”[60][illegible][61]

[illegible]

[illegible][62][illegible]

[illegible]Elba[illegible]Mari[illegible]

[illegible][63]

[illegible]1974[illegible]Kanesh[illegible]Kül Tepe[illegible][64][illegible]

[illegible]1400[illegible]814[illegible]

[illegible]—[illegible]1000[illegible][65][illegible]7[illegible]4[illegible][66][illegible]2[illegible]—[illegible]

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[illegible]

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[illegible]5000[illegible]——[illegible]——[illegible]

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[illegible]·[illegible]·K. [illegible]·[illegible]·[illegible]·[illegible]·[illegible]——[illegible]·[illegible]3000[illegible]1500[illegible]·[illegible]Jerry Bently[illegible]·[illegible]Herbert Ziegler[illegible]2003[illegible]·[illegible]Richard Bulliet[illegible]1997[illegible]·[illegible]Howard Spodek[illegible]2[illegible]2001[illegible]·[illegible]1963[illegible]·[illegible]Göran Burenhult[illegible]3[illegible]4[illegible]1994[illegible]·[illegible]1986[illegible]·[illegible]4000[illegible]1987[illegible]·[illegible]1995[illegible]2[illegible]——[illegible]1985[illegible]·[illegible]

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[1] [illegible]·[illegible]2000[illegible]108[illegible]

[2] [illegible]·[illegible]Colin Renfrew[illegible]1989[illegible]J. P. [illegible]Mallory[illegible]1989[illegible]“[illegible]”[illegible]·[illegible]Jan Vasina[illegible]“[illegible]”[illegible]36[illegible]2[illegible]1995[illegible]137—195[illegible]·[illegible]Heike Schmidt[illegible]

[3] [illegible]·[illegible]1998[illegible]2[illegible]8[illegible]·[illegible]Ben Finney[illegible]5[illegible]2[illegible]1994[illegible]273—298[illegible]·R. [illegible]

[illegible]5[illegible]2[illegible]1994[illegible]·[illegible]N. S. W. [illegible]1995[illegible]164—165[illegible]

[4] [illegible]2[illegible]

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[6] [illegible]·[illegible]“[illegible]”[illegible]2[illegible]1995[illegible]159[illegible]

[7] [illegible]·R. [illegible]3[illegible]

[8] [illegible]·[illegible]·[illegible]Het Spinius[illegible]1998[illegible]7—8[illegible]29—53[illegible]

[9] [illegible]·[illegible]Thomas Barfield[illegible]1989[illegible]·[illegible]·[illegible]Nicola di Cosmo[illegible]10[illegible]1[illegible]1999[illegible]1—40[illegible]

[10] [illegible]·[illegible]——[illegible]1250—1350[illegible]1989[illegible]·[illegible]·[illegible]·K. [illegible]500[illegible]5000[illegible]1992[illegible]

[11] [illegible]·[illegible]——[illegible]·D. [illegible]1997[illegible]

[12] “[illegible]”[illegible]——[illegible]53[illegible]

[13] [illegible]·[illegible]·[illegible]1988[illegible]167—168[illegible]

[14] [illegible]·L. [illegible]Charles L. Redman[illegible]·[illegible]3[illegible]1994[illegible]32[illegible]

[15] [illegible]S. N. [illegible]Kramer[illegible]·B. [illegible]Pritchard[illegible]3[illegible]1969[illegible]647—648[illegible]A. [illegible]·[illegible]87[illegible]

[16] [illegible]·K. [illegible]·[illegible]·[illegible]1700[illegible]——[illegible]170[illegible]143—199[illegible]153—155[illegible]

[17] [illegible]·[illegible]·[illegible]Christopher Braider[illegible]1988[illegible]27[illegible]

[18] [illegible]

[19] [illegible]·K. [illegible]·[illegible]·[illegible]81—114[illegible]86[illegible]

[20] [illegible]·[illegible]·[illegible]Michael Adas[illegible]2001[illegible]308—324[illegible]5[illegible]1[illegible]1994[illegible]1—21[illegible]

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[25] □□□·J. □□□Robert J. Wenke□□□□□□□□□□□□3□□□□□□□□□□□□□□1990□□□□498□□

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[33] E. A. □□□□Wrigley□□□□□□□□□□□□□□□□□□□□□□□□□1969□□□□55—57□□

[34] □□□□□□□·M. □□□□□Thomas M. Whitmore□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□300□□□□□□□□□□□□□□□□B. L. □□□□□Turner II□□□□□□□□□□□□□□□□□□1990□□□□37□□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”

[35] I. G . □□□□□□□□□□□□□□□□□□□□□□□□1993□□□□13□□□□□□□□□□□□□□□□□□□□□□□□□□

[36] □□□·D. □□□□□□□□□□□□□□□□1996□□□□128□□

[37] E. L. □□□□□□□□□□□□□□□□□□□□□□□□□□□□2□□□□□□□□□□□□□□1987□□□□3□□

[38] □□□□□□□□□□□□□□□□11□□□□□212—214□□

[39] □□·□□□□□□□□□□□□□□□□□□□□□□1977□□□□102□□

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[41] [illegible]·[illegible]111[illegible]

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[43] [illegible]·F. [illegible]3[illegible]

[44] [illegible]·J. M. [illegible]Henry J. M. Chaessen[illegible]·[illegible]Peter Skalnik[illegible]1978[illegible]·[illegible]·K. [illegible]Stephen K. Sanderson[illegible]·[illegible]1995[illegible]”[illegible]80—81[illegible]·[illegible]7[illegible]1978[illegible]108—127[illegible]

[45] [illegible]172[illegible]

[46] [illegible]·G. [illegible]1993[illegible]4[illegible]

[47] [illegible]·[illegible]·[illegible]Michael Bullock[illegible]1953[illegible]1[illegible]

[48] [illegible]1[illegible]36[illegible]

[49] [illegible]·[illegible]1990[illegible]20[illegible]

[50] [illegible]“[illegible]‘[illegible]’[illegible]……[illegible]”[illegible]3[illegible]·[illegible]David Fernbach[illegible]1981[illegible]926[illegible]25[illegible]1974[illegible]890—891[illegible]——[illegible]

[51] [illegible]·[illegible]25[illegible]1[illegible]1978[illegible]1[illegible]G. D. [illegible]1996[illegible]10[illegible]“[illegible]”[illegible]

[52] [illegible]M. I. [illegible]1973[illegible]

[53] [illegible]·[illegible]·[illegible]1961[illegible]87[illegible]88[illegible]

[54] [illegible]·[illegible]·[illegible]Hubert Darke[illegible]2[illegible]1978[illegible]131—132[illegible]C. [illegible]·[illegible]C.Warren Hollister[illegible]5[illegible]1982[illegible]163[illegible]

[55] [illegible]1997[illegible]129[illegible]134[illegible]

[56] [illegible]175[illegible]

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[58] [illegible]·K. [illegible]Stephen K. Sanderson[illegible]267[illegible]

[59] [illegible]·[illegible]·[illegible]“[illegible]”[illegible]——[illegible]2[illegible]1993[illegible]123—124[illegible]

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[61] [illegible]·M. [illegible]Stanley M. Burstein[illegible]1982[illegible]5[illegible]

[62] [illegible]·[illegible]·[illegible]Mariá Eugenia Aubert[illegible]·[illegible]Mary Turton[illegible]85—87[illegible]Snooks[illegible]345[illegible]

[63] [illegible]·[illegible]22—23[illegible]1800[illegible]

[64] [illegible]141—143[illegible]

[65] [illegible]95[illegible]142[illegible]·[illegible]Valeri Hansen[illegible]W. W. [illegible]2000[illegible]92[illegible]

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[67] [illegible]26[illegible]

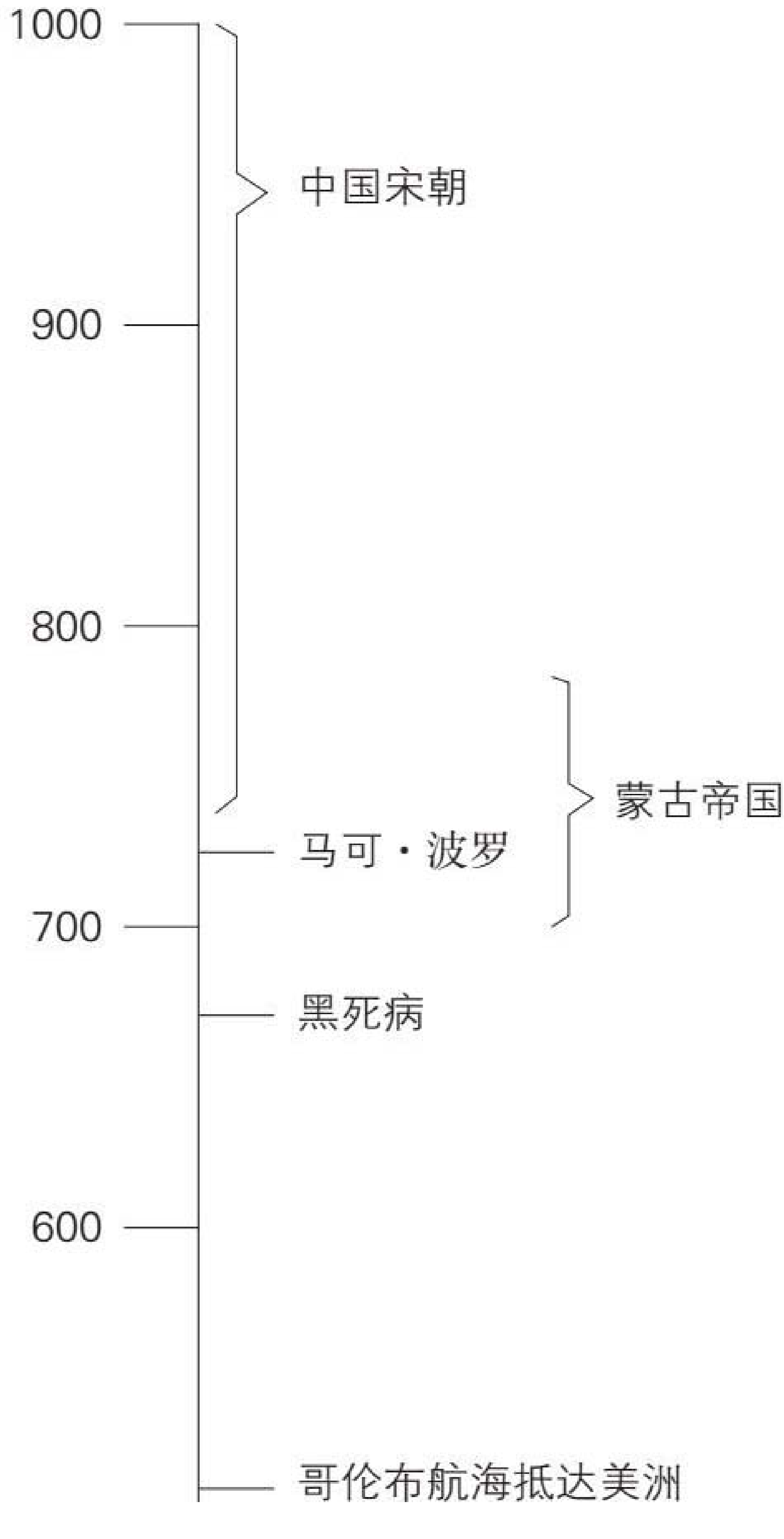
[68] [illegible]45—46[illegible]

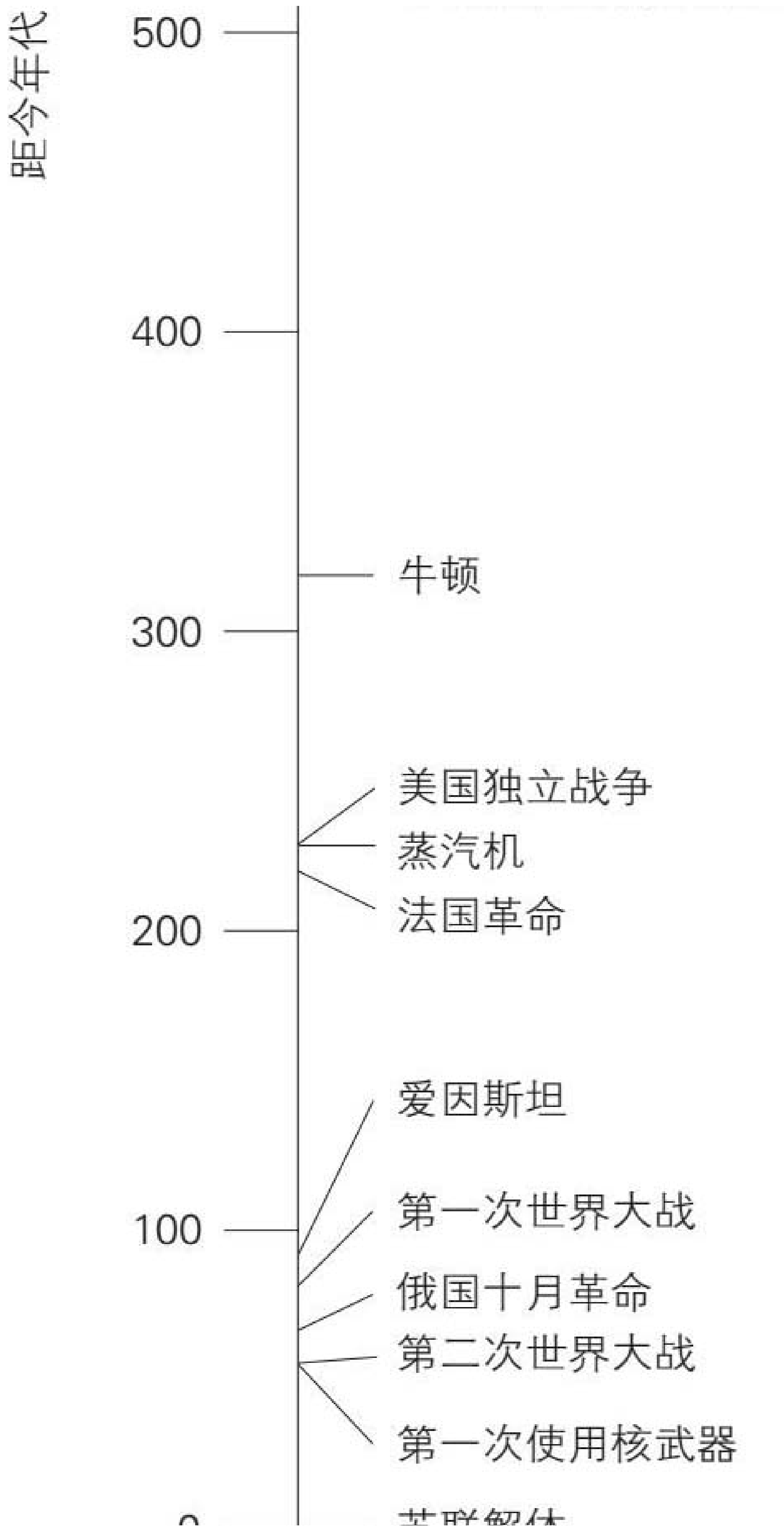
[69] [illegible]——[illegible]40—41[illegible]79—81[illegible]

[70] [illegible]·[illegible]“[illegible]”[illegible]70[illegible]

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1000
中国宋朝
900
800
蒙古帝国
马可·波罗
700
黑死病
600
哥伦布航海抵达美洲



距今年代
500
400
牛顿
300
美国独立战争
蒸汽机
法国革命
200
爱因斯坦
第一次世界大战
100
俄国十月革命
第二次世界大战
第一次使用核武器



**[illegible]11.1 [illegible]**

# [illegible]11[illegible]
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[illegible]“[illegible]1400[illegible]”[4]

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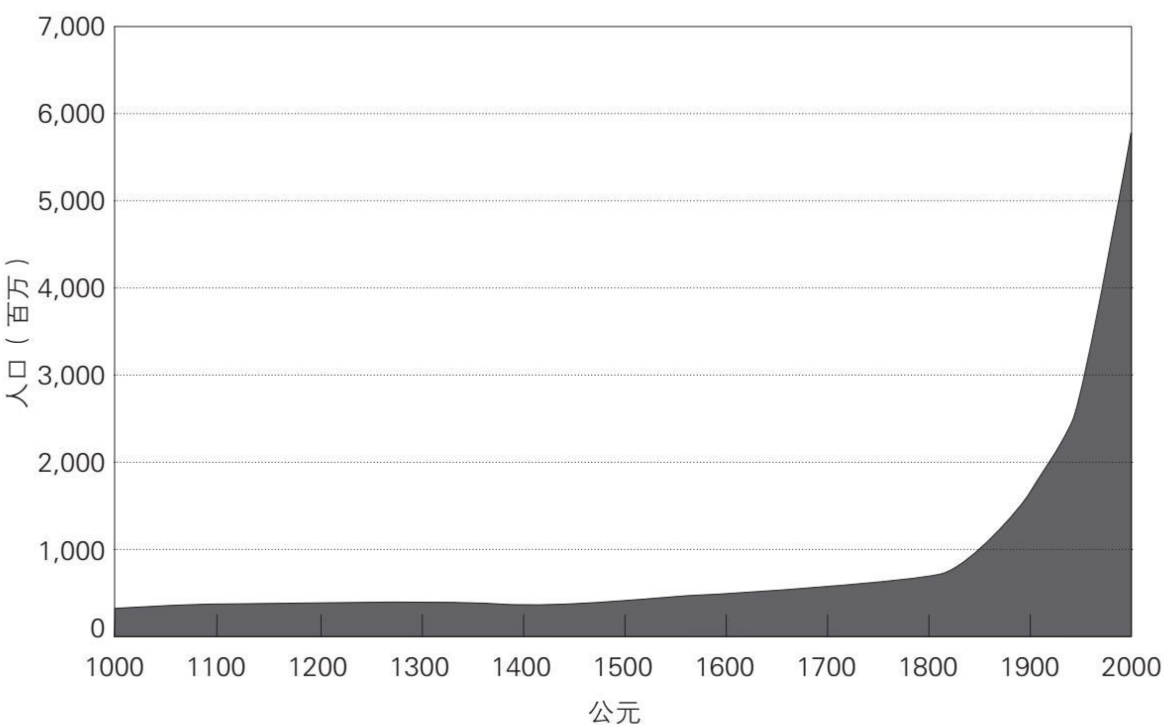
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[illegible]11.1[illegible]21[illegible]·[illegible]·[illegible]“[illegible]”[illegible][15][illegible]·[illegible]Carlo Cipolla[illegible]“[illegible]”[16][illegible]1/4[illegible]140[illegible]

[illegible]

[illegible]200[illegible]20[illegible]

[illegible]9.3[illegible]·[illegible]David Landes[illegible]

> [illegible]——[illegible]18[illegible][17]

[illegible]100[illegible]50 000[illegible]18[illegible]18[illegible]90[illegible]300[illegible]19[illegible]30[illegible]135[illegible][18][illegible]18[illegible]10.3[illegible]10.4[illegible]

**□11.1 □□□□□□□□□□□400—□□2000□□**

| 年份 | 地区（百万） | | | | | | | | | | | | 总计 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 中国 | 印度次大陆 | 西南亚 | 日本 | 亚洲其他地区 | 欧洲 | 苏联 | 北非 | 撒哈拉以南非洲 | 北美 | 中南美洲 | 大洋洲 | |
| 公元前 400 年 | 19 | 30 | 42 | 1 | 3 | 19 | 13 | 10 | 7 | 1 | 7 | 1 | 153 |
| 公元前 300 年 | 30 | 42 | 47 | 1 | 3 | 22 | 13 | 12 | 8 | 1 | 7 | 1 | 187 |
| 公元前 200 年 | 40 | 55 | 52 | 1 | 4 | 25 | 14 | 14 | 9 | 2 | 8 | 1 | 225 |
| 公元前 100 年 | 55 | 50 | 50 | 1 | 4 | 28 | 13 | 14 | 10 | 2 | 9 | 1 | 237 |
| 公元元年 | 70 | 46 | 47 | 2 | 5 | 31 | 12 | 14 | 12 | 2 | 10 | 1 | 252 |
| 公元 100 年 | 65 | 45 | 46 | 2 | 5 | 37 | 12 | 15 | 13 | 2 | 9 | 1 | 252 |
| 公元 200 年 | 60 | 45 | 46 | 2 | 5 | 44 | 13 | 16 | 14 | 2 | 9 | 1 | 257 |
| 公元 300 年 | 42 | 40 | 45 | 3 | 6 | 30 | 13 | 14 | 16 | 2 | 10 | 1 | 222 |
| 公元 400 年 | 25 | 32 | 45 | 4 | 7 | 36 | 12 | 13 | 18 | 2 | 11 | 1 | 206 |
| 公元 500 年 | 32 | 33 | 41 | 5 | 8 | 30 | 11 | 11 | 20 | 2 | 13 | 1 | 207 |
| 公元 600 年 | 49 | 37 | 32 | 5 | 11 | 22 | 11 | 7 | 17 | 2 | 14 | 1 | 208 |
| 公元 700 年 | 44 | 50 | 25 | 4 | 12 | 22 | 10 | 6 | 15 | 2 | 15 | 1 | 206 |
| 公元 800 年 | 56 | 43 | 29 | 4 | 14 | 25 | 10 | 9 | 16 | 2 | 15 | 1 | 224 |
| 公元 900 年 | 48 | 38 | 33 | 4 | 16 | 28 | 11 | 8 | 20 | 2 | 13 | 1 | 222 |
| 公元 1000 年 | 56 | 40 | 33 | 4 | 19 | 30 | 13 | 9 | 30 | 2 | 16 | 1 | 253 |
| 公元 1100 年 | 83 | 48 | 28 | 5 | 24 | 35 | 15 | 8 | 30 | 2 | 19 | 2 | 299 |
| 公元 1200 年 | 124 | 69 | 27 | 7 | 31 | 49 | 17 | 8 | 40 | 3 | 23 | 2 | 400 |
| 公元 1300 年 | 83 | 100 | 21 | 10 | 29 | 70 | 16 | 8 | 60 | 3 | 29 | 2 | 431 |
| 公元 1400 年 | 70 | 74 | 19 | 9 | 29 | 52 | 13 | 8 | 60 | 3 | 36 | 2 | 375 |
| 公元 1500 年 | 84 | 95 | 23 | 10 | 33 | 67 | 17 | 9 | 78 | 3 | 39 | 3 | 461 |
| 公元 1600 年 | 110 | 145 | 30 | 11 | 42 | 89 | 22 | 9 | 104 | 3 | 10 | 3 | 578 |
| 公元 1700 年 | 150 | 175 | 30 | 25 | 53 | 95 | 30 | 10 | 97 | 2 | 10 | 3 | 680 |
| 公元 1800 年 | 330 | 180 | 28 | 25 | 68 | 146 | 49 | 10 | 92 | 5 | 19 | 2 | 954 |
| 公元 1900 年 | 415 | 290 | 38 | 45 | 115 | 295 | 127 | 43 | 95 | 90 | 75 | 6 | 1 634 |
| 公元 2000 年 | 1 262 | 1 327 | 181 | 127 | 680 | 514 | 290 | 151 | 659 | 313 | 516 | 30 | 6 057 |

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[illegible]“[illegible]”[illegible]·[illegible]Anthony Wrigley[illegible]1820[illegible][19][illegible]19[illegible]5[illegible]20[illegible]16[illegible]20[illegible]5[illegible][20][illegible]·[illegible]John McNeill[illegible]“[illegible]1900[illegible]1900[illegible]”[21][illegible]6.1[illegible]100[illegible]——[illegible]16[illegible]Australasia[illegible]

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[illegible]1980[illegible]65%[illegible]38%[illegible]21[illegible]50%[illegible][22][illegible]

[illegible]20[illegible]2000[illegible]44—45[illegible]62—63[illegible]70—80[illegible]14.4[illegible][23][illegible]“[illegible]”[illegible]

[illegible]800[illegible]1/10[illegible]300[illegible]1/2[illegible]·[illegible]Charles Tilly[illegible]“[illegible]”[24][illegible]19[illegible]·[illegible]“[illegible]”[illegible]

[illegible]·[illegible]“[illegible]”[illegible]“[illegible]……[illegible]”[illegible][25][illegible]1884[illegible]——[illegible]·[illegible]David Courtwright[illegible]“[illegible]”[illegible][26][illegible]

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[illegible][27][illegible]60[illegible]

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[illegible]E. A. [illegible]“[illegible]”[illegible][35][illegible]19[illegible]20[illegible]

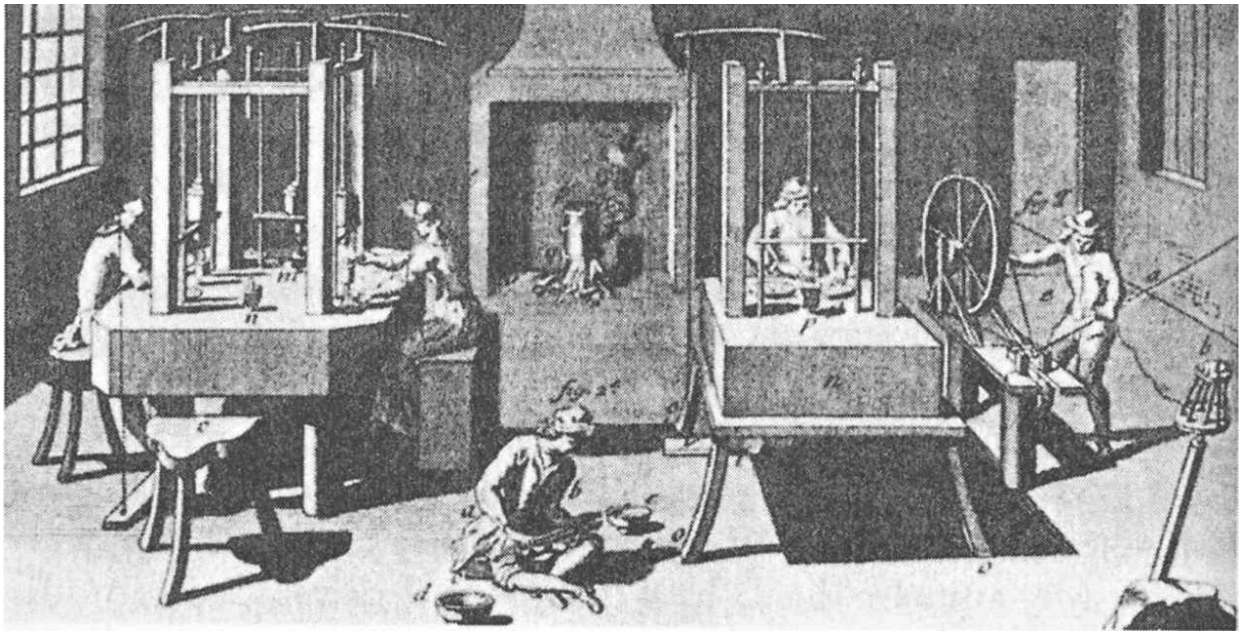
[illegible]·[illegible]Abraham Darby[illegible]18[illegible][36][illegible]

[illegible]T. S. [illegible]Ashton[illegible]“[illegible]1760[illegible]”[illegible][37][illegible][38][illegible]

[illegible]·[illegible]1904—1905[illegible][39][illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible][40][illegible]

[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[41][illegible]
11.2[illegible]“[illegible]”[illegible]——[illegible]
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[illegible]·[illegible]·[illegible]1992[illegible]78[illegible]——[illegible]·[illegible]·[illegible]·[illegible]René-Antoine Ferchault de Réaumur[illegible]1762[illegible]

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[illegible]18[illegible]19[illegible]·[illegible]·[illegible]

[illegible]1750[illegible]1800[illegible]1800[illegible][43]

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[illegible]20[illegible]80[illegible]“[illegible]”[illegible]·[illegible]“[illegible]18[illegible]”[illegible][45][illegible]“[illegible]”[illegible]·[illegible]1[illegible]“[illegible]”[illegible]2[illegible]“[illegible]”[illegible]3[illegible]

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[illegible]·[illegible]“[illegible]”——[illegible]——[illegible]·[illegible]Richard Dawkins[illegible]“[illegible]”[illegible][46]

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[illegible] “[illegible]”[51]

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J. L.[illegible]Anderson[illegible]1991[illegible]·[illegible]2[illegible]1995[illegible]·[illegible]1990[illegible]E. A.[illegible]1988[illegible]1987[illegible]E. L.[illegible]Jones[illegible]1987[illegible]1988[illegible]·[illegible]·[illegible]1998[illegible]2000[illegible]1997[illegible]1800[illegible]·[illegible]1998[illegible]·[illegible]990—1992[illegible]1992[illegible]·[illegible]1982[illegible]“[illegible]”[illegible]

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[1] [illegible]·[illegible]——[illegible]2[illegible]1985[illegible]33[illegible]

[2] [illegible]·R. [illegible]

[3] [illegible]·[illegible]24—72[illegible]1000[illegible]·[illegible]John Mann[illegible]1000[illegible]1999[illegible]

[4] [illegible]71[illegible]

[5] [illegible]·M. [illegible]10[illegible]——[illegible]2001[illegible]362[illegible]

[6] [illegible]42[illegible]

[7] [illegible]·D. [illegible]4[illegible]1944[illegible]158[illegible]

[8] [illegible]·J. [illegible]·[illegible]——[illegible]1993[illegible]·M. [illegible]Anatoly M. Khazanov[illegible]·[illegible]Julia Crookenden[illegible]2[illegible]1994[illegible]

[9] [illegible]G. E. R. [illegible]Lloyd[illegible]J. [illegible]Chadwick[illegible]W. N. [illegible]Mann[illegible]1978[illegible]163[illegible]

[10] [illegible]·[illegible]1[illegible]1998[illegible]

[11] [illegible]1[illegible]85—94[illegible]149—157[illegible]·[illegible]·[illegible]Nicola di Cosmmo[illegible]10[illegible]1999[illegible]1[illegible]1—40[illegible]

[12] [illegible]·[illegible]Terence Armstrong[illegible]1965[illegible]36[illegible]·[illegible]James Forsyth[illegible]1581—1990[illegible]1992[illegible]10—16[illegible]

[13] [illegible]65[illegible]

[14] [illegible]·W. [illegible]·[illegible]2[illegible]2000[illegible]9[illegible]

[15] [illegible]·[illegible]·[illegible]40[illegible]228[illegible]

[16] [illegible]·M. [illegible]6[illegible]1974[illegible]114—115[illegible]

[17] [illegible]·[illegible]1750[illegible]1969[illegible]6[illegible]

[18] [illegible]·[illegible]1990[illegible]99[illegible]

[19] E. A. [illegible]E. A. Wrigley[illegible]1988[illegible]54—55[illegible]

[20] [illegible]·R. [illegible]14—15[illegible]6[illegible]

[21] [illegible]·R. [illegible]15[illegible]

[22] [illegible]·[illegible]1988[illegible]513[illegible]

[23] [illegible]·[illegible]Norbert Elias[illegible]·[illegible]Edmund Jephcott[illegible]1992[illegible]

[24] [illegible]·[illegible]990—1992[illegible]1992[illegible]69[illegible]68[illegible]

[25] [illegible]·[illegible]1[illegible]·[illegible]1978[illegible]186[illegible]

[26] [illegible]·[illegible]2002[illegible]

[27] [illegible]·[illegible]Tony Swain[illegible]1993[illegible]

[28] [illegible]1997[illegible]Kenneth Pomeranz[illegible]2000[illegible]·[illegible]·[illegible]1998[illegible]

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[50] □□□□□□□□□·□□□Andrew Sherratt□□□□□□□□□□□□□□□□□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□3□□□1□□1995□□□21□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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# [illegible]12[illegible]
## [illegible]

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[illegible]1000—1700[illegible]——16[illegible]——[illegible]16[illegible]

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[illegible]·[illegible]Marshall Hodgson[illegible]1967[illegible]

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[illegible]12[illegible]13[illegible]·[illegible]Asa Briggs[illegible]“[illegible]‘[illegible]’[illegible]Wiltshire[illegible]Dorset[illegible]Mere[illegible]……[illegible]13[illegible]12[illegible]”[8][illegible]

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[illegible]12[illegible]“[illegible]”[illegible]10%[illegible][11][illegible]·[illegible]“[illegible]”[illegible]100[illegible][12][illegible]·[illegible]——[illegible]“[illegible]……[illegible]”[13][illegible][14]

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[illegible][15]

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·Robert Lopez“

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[17]·Thomas Allsen

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1325—1355[19]

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1000—

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·Andrew Watson

[21]

[illegible]——[illegible]
——[illegible]
[illegible]1000[illegible]
—[illegible]1500
[illegible]

[illegible]—[illegible]18[illegible]“[illegible]”[illegible][22][illegible]

[illegible]1[illegible]·[illegible]“[illegible]”[illegible]
[23][illegible]9[illegible]al Jahiz[illegible]

> [illegible]……[illegible]Keda[illegible]……[illegible]……[illegible]……[illegible]*fir*[illegible][24]

[illegible]“[illegible]2000[illegible]”[illegible]
[25]

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[illegible]”[27]

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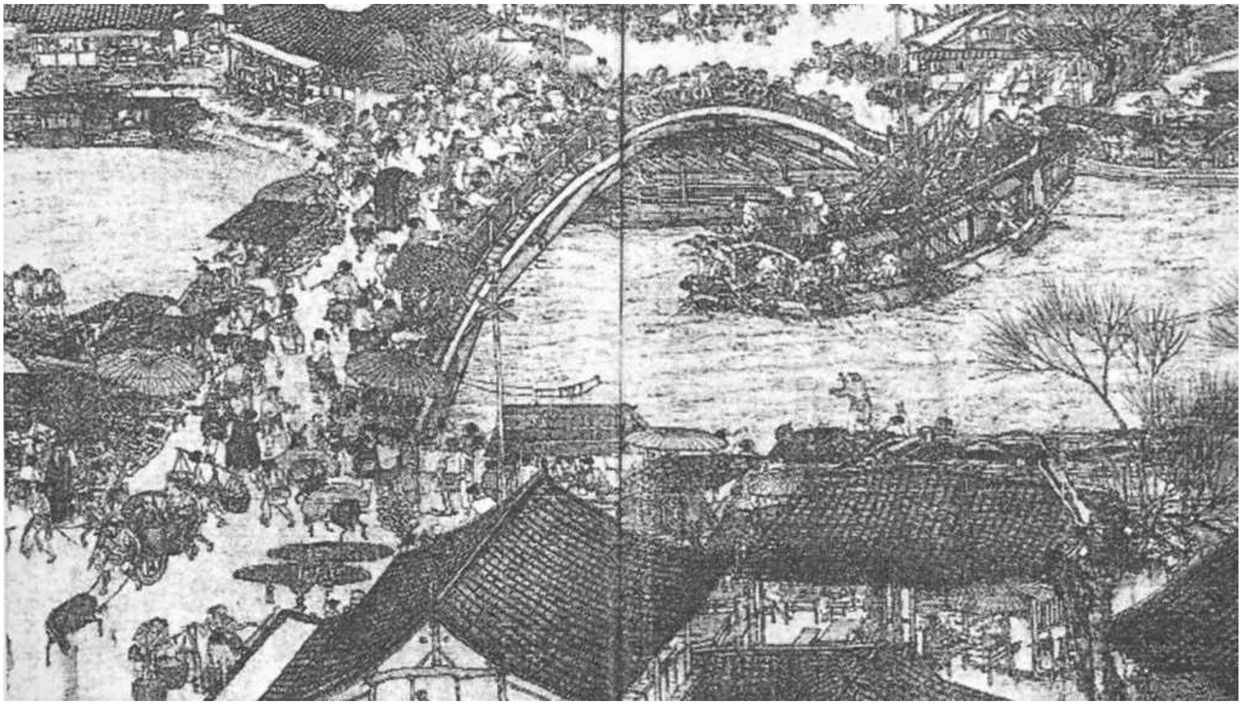
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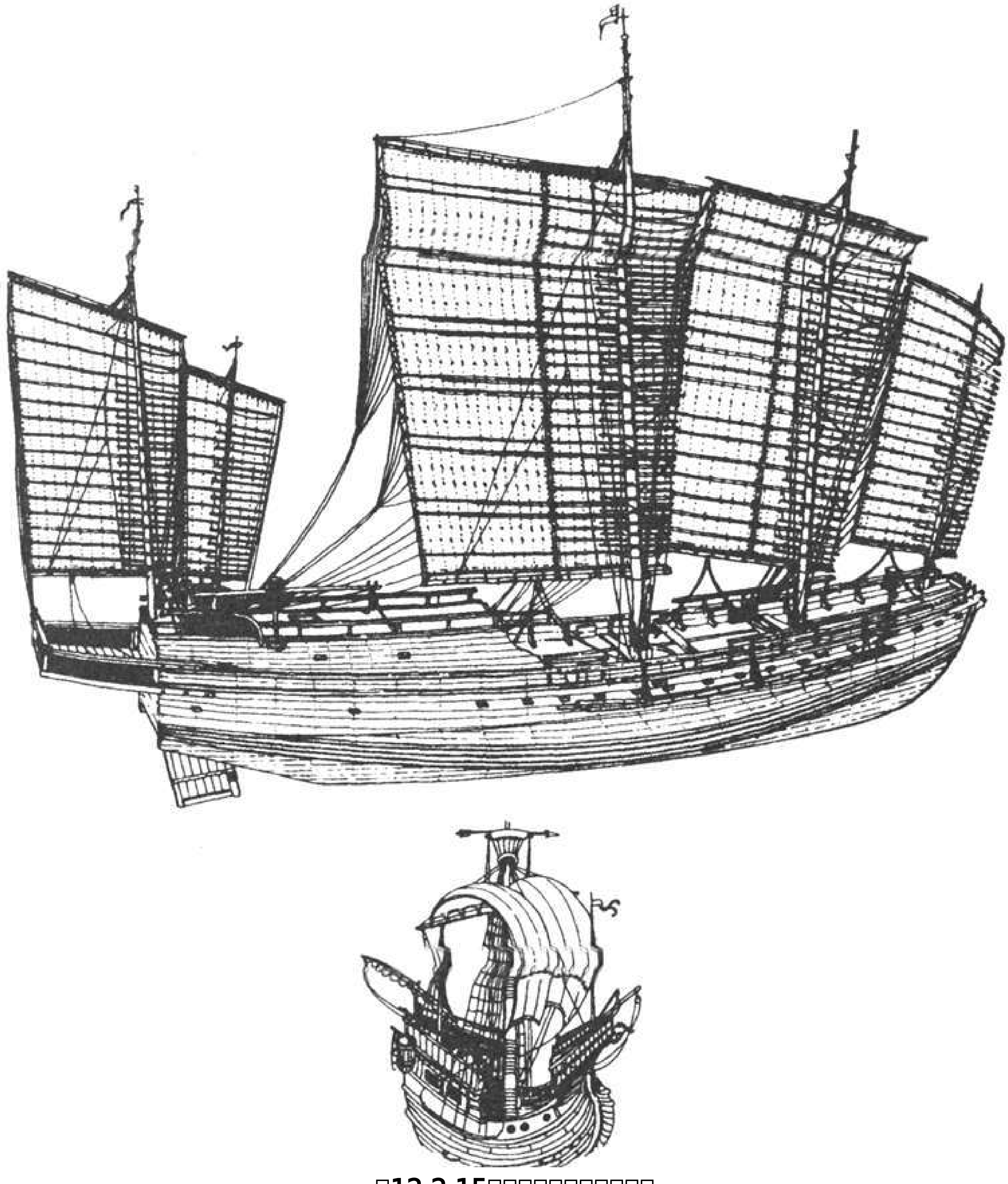
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[illegible]—[illegible]



[illegible]—[illegible]

[illegible]—[illegible]—[illegible]



**[illegible]12.2 15[illegible]**

[illegible]1405—1433[illegible]7[illegible]60[illegible]4[illegible]5[illegible]·[illegible]50[illegible]

[illegible]—[illegible]

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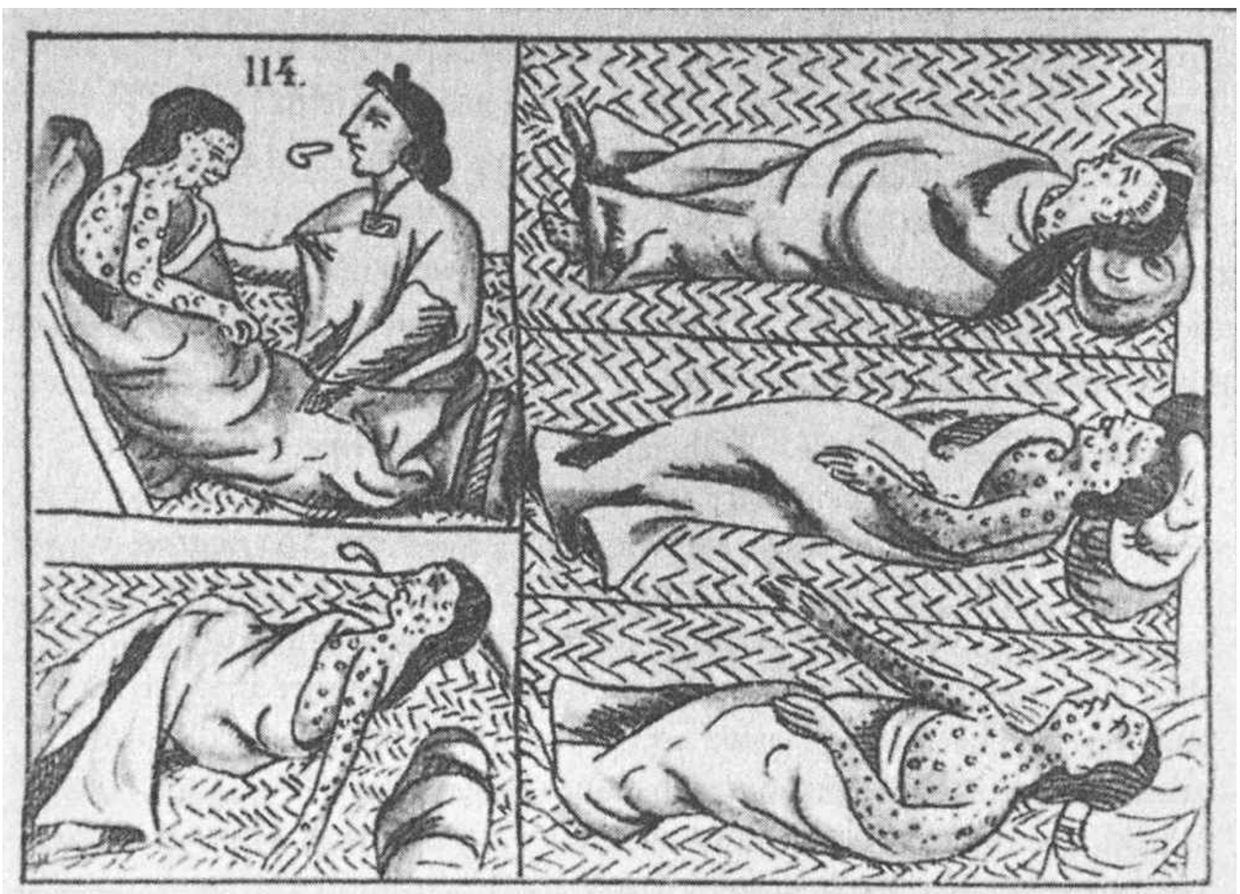
14[illegible]—[illegible]14[illegible]15[illegible]16[illegible]——[illegible]16[illegible]1000[illegible]“[illegible]16[illegible]”[43]

[illegible]16[illegible]—[illegible][44][illegible]“[illegible]”[illegible][45]

[illegible]—[illegible]·[illegible]1972[illegible]1500[illegible]—[illegible]

[illegible]
16[illegible][46]

[illegible]16[illegible]70%[illegible]50%——70%[illegible][47][illegible]“[illegible]12.3[illegible]”[48][illegible]1585[illegible]Roanoke[illegible]·[illegible]Thomas Hariot[illegible]




**[illegible]12.3 16[illegible]**

[illegible]16[illegible]“[illegible]”[illegible]·[illegible]900—1900[illegible]1986[illegible]9[illegible]4[illegible]12[illegible]Lam. Cliii[illegible]114[illegible]

[illegible]

[illegible]20[illegible]40[illegible]60[illegible]120[illegible]……[illegible][49]

[illegible]—[illegible][50]

[illegible]—[illegible]casava[illegible]tapioca[illegible][51][illegible]—[illegible]16[illegible]—[illegible][52][illegible]16[illegible]60[illegible]1/3[illegible][53][illegible]—[illegible]16[illegible]

[illegible]

[illegible]

[illegible]—[illegible]—[illegible]·[illegible]

[illegible]……[illegible]

> [illegible]manioc[illegible][54]

[illegible]“[illegible]”[illegible][55][illegible]16[illegible]

[illegible]——[illegible]——[illegible][56][illegible]·[illegible]Peter Stearns[illegible]

> [illegible]1770[illegible]14[illegible][57]

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[illegible]18[illegible]·[illegible]·[illegible]17[illegible]

[illegible]“[illegible]”[illegible]17[illegible]——[illegible]16[illegible]17[illegible][60]

[illegible]16[illegible]18[illegible][61]

[illegible]——[illegible]——[illegible]17[illegible]—[illegible]19[illegible]1800[illegible]·[illegible][62][illegible][63]

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[illegible]10[illegible][72][illegible]18[illegible]

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[illegible]·[illegible]16[illegible]17[illegible]“[illegible]”“[illegible]”[illegible][75][illegible]·[illegible]“‘[illegible]’……[illegible]……[illegible]500[illegible]”[76][illegible]16[illegible]17[illegible]“[illegible]”[illegible]·[illegible]Steven Shapin[illegible]“[illegible]”[illegible][77][illegible]

[illegible]16[illegible]17[illegible]·[illegible]·[illegible][78][illegible]13[illegible]

[illegible]17[illegible]——[illegible]

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16 · · · Charles Loyseau “ ” [80] “ ” 19 · ·

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[illegible][83][illegible]17[illegible]19[illegible][84]

[illegible]15[illegible]“[illegible]”[85][illegible]15[illegible]18[illegible]1502[illegible]·[illegible]·[illegible]Robert de Balsac[illegible]“[illegible]”[86][illegible]100[illegible]

[illegible][87][illegible]—[illegible]1221[illegible][88][illegible]15[illegible]16[illegible]——[illegible]——[illegible]16[illegible]19[illegible][89]

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[illegible]13[illegible]·[illegible]Catharina Lis[illegible]·[illegible]Hugo Soly[illegible]

> [illegible]300[illegible]……13%[illegible]33%[illegible]……36%[illegible]……16%[illegible]……3%[illegible][90]

[illegible]·[illegible]Maxine Berg[illegible]17[illegible]Staffordshire[illegible]

> [illegible]Needlewood Forest[illegible]·[illegible]Cannock Chase[illegible]Kinvel Forest[illegible]Worcestershire[illegible]Stourbridge[illegible]Bursham[illegible][91]

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[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible][94][illegible][95][illegible]“[illegible]”[illegible]·[illegible]·[illegible]Jan De Vries[illegible]18[illegible]19[illegible]“[illegible]Industrial[illegible]”[illegible]“[illegible]industrious[illegible]”[illegible][96]

[illegible]—[illegible]17[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

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[illegible]—[illegible]—[illegible]1700[illegible]18[illegible]

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—— 1700 18 17 70—75% 40% [98] 3/4 [99] 4000 1759 50% [100] · Peter Mathias “ ”[101] 85% 13% 1% [102]

18 1700

[illegible]——[illegible]14[illegible]14—17[illegible]——[illegible]16[illegible]16[illegible]

[illegible]18[illegible]——[illegible]

[illegible]·[illegible]“[illegible]”[103]——[illegible]1700[illegible]

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[1] [illegible]·[illegible]334[illegible]

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[3] [illegible]200[illegible]

[4] [illegible]·[illegible]·[illegible]

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[13] [illegible]—[illegible]331[illegible]1250—1276[illegible]H. M. [illegible]1962[illegible]87[illegible]

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[30] □□2□□□□□□□□□□□□□□□□□□□□□64□□

[31] S. A. M. □□□□Adshead□□□□□□□□□□□2□□□□□□□□□□□1995□□□17□□

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[33] □□□□□□□□□□□□·□□□Arnold Pacey□□□□□□□□□□□□□□□□□□□□□□□□□□1990□□□65—66□□

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[40] 7 1954—2003

[41] 31

[42] 1405—1433

[43] · 1 · Ben Fowks 1976 247 · " —— " · Tom Bottomore 2 1991 590—591

[44] ·O. Dennis O. Flynn · Artunro Giráldez 1571 18 13 2 2002 393

[45] ·O. · " " 1571 6 2 1995 201—221

[46] · —— 1992 55—56 · Carl Ipsen

[47] · 2001 235 16 15% —— 90% 11.1 J.R. 4 1979 16 1500—1600 75% 3900 1000 · 50% 1750 860 · Woodrow Borah · F. Sherburne F. Cook 1963 1500 90% 233-236 · —— 50—56 · Bruce Castleman

[48] · 1492 1972 36

[49] · 40—41 · B. David B. Quinn 1584—1590 1955 1 387

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[51] 170

[52] [illegible]199[illegible]

[53] [illegible]60[illegible]

[54] [illegible]·[illegible]1990[illegible]70[illegible]

[55] [illegible]185[illegible]199—201[illegible]

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[57] [illegible]·N. [illegible]1993[illegible]18[illegible]

[58] [illegible]168[illegible]172[illegible]

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[64] [illegible]·[illegible]1982[illegible]

[65] [illegible]·[illegible]1990[illegible]33[illegible]384—388[illegible]

[66] [illegible]167[illegible]

[67] [illegible]45[illegible]

[68] [illegible]·[illegible]John Bushnell[illegible]1905—1906[illegible]1985[illegible]180[illegible]

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[73] [illegible]129[illegible]

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[97] [illegible]·[illegible]·[illegible]1973[illegible]463[illegible]46[illegible]1979[illegible]461[illegible]——[illegible]

[98] [illegible]1688[illegible]N. E. R. [illegible]1985[illegible]13—14[illegible]100[illegible]

[99] [illegible]·[illegible]1700—1914[illegible]2[illegible]1983[illegible]26[illegible]

[100] [illegible]13—14[illegible]

[101] [illegible]29[illegible]

[102] [illegible]59[illegible]

[103] [illegible]990—1992[illegible]17[illegible]

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**□13.1 □□□□□□1750—1980□**

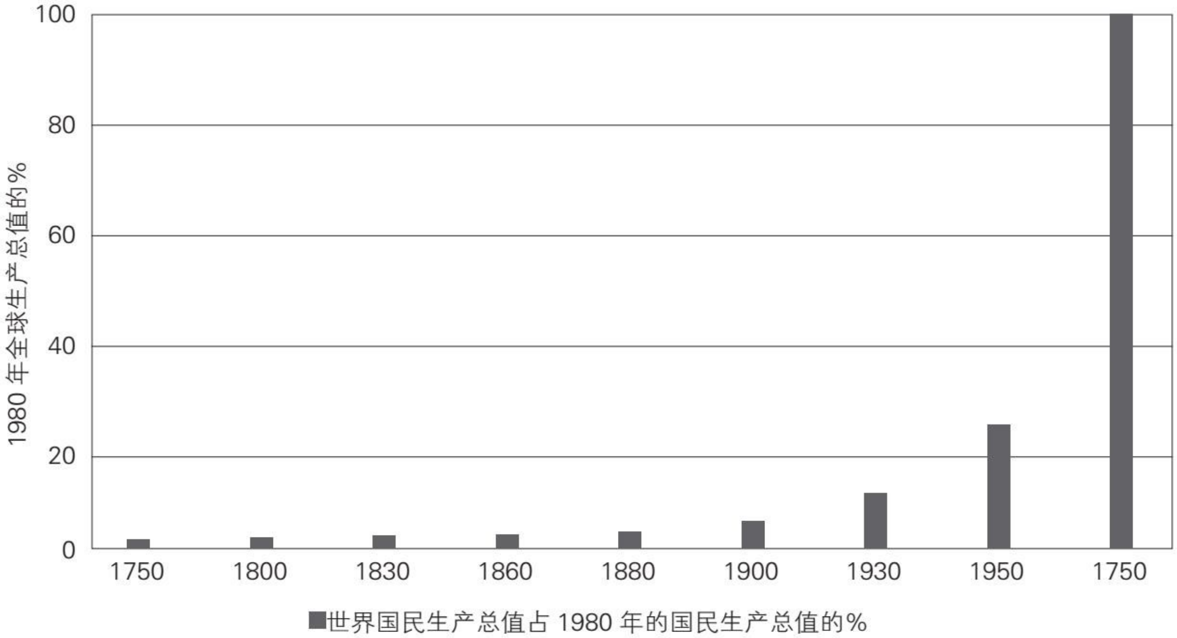
| | 1750 | 1800 | 1830 | 1860 | 1880 | 1900 | 1913 | 1928 | 1938 | 1953 | 1963 | 1973 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 发达国家 | 34 | 47 | 73 | 143 | 253 | 481 | 863 | 1259 | 1562 | 2870 | 4699 | 8432 | 9718 |
| 英国 | 2 | 6 | 18 | 45 | 73 | 100 | 127 | 135 | 181 | 258 | 330 | 462 | 441 |
| 德国 | 4 | 5 | 7 | 11 | 27 | 71 | 138 | 158 | 214 | 180 | 330 | 550 | 590 |
| 法国 | 5 | 6 | 10 | 18 | 25 | 37 | 57 | 82 | 74 | 98 | 194 | 328 | 362 |
| 意大利 | 3 | 4 | 4 | 6 | 8 | 14 | 23 | 37 | 46 | 71 | 150 | 258 | 319 |
| 俄罗斯／苏联 | 6 | 8 | 10 | 16 | 25 | 48 | 77 | 72 | 152 | 328 | 760 | 1345 | 1630 |
| 美国 | | 1 | 5 | 16 | 47 | 128 | 298 | 533 | 528 | 1373 | 1804 | 3089 | 3475 |
| 日本 | 5 | 5 | 5 | 6 | 8 | 13 | 25 | 45 | 88 | 88 | 264 | 819 | 1001 |
| 第三世界 | 93 | 99 | 112 | 83 | 67 | 60 | 70 | 98 | 122 | 200 | 439 | 927 | 1323 |
| 中国 | 42 | 49 | 55 | 44 | 40 | 34 | 33 | 46 | 52 | 71 | 178 | 369 | 553 |
| 印度／巴基斯坦 | 31 | 29 | 33 | 19 | 9 | 9 | 13 | 26 | 40 | 52 | 91 | 194 | 254 |
| 世界 | 127 | 146 | 185 | 226 | 320 | 541 | 933 | 1357 | 1684 | 3070 | 5138 | 9359 | 11041 |

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**□13.2 □□□□□□1750—1980□□□□□□□□□□□□**

| | 1750 | 1800 | 1830 | 1860 | 1880 | 1900 | 1913 | 1928 | 1938 | 1953 | 1963 | 1973 | 1980 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 发达国家 | 26.8 | 32.0 | 39.7 | 63.3 | 79.1 | 88.9 | 92.5 | 92.8 | 92.8 | 93.5 | 91.5 | 90.1 | 88.0 |
| 英国 | 1.6 | 4.1 | 9.8 | 19.9 | 22.8 | 18.5 | 13.6 | 10.0 | 10.7 | 8.4 | 6.4 | 4.9 | 4.0 |
| 德国 | 3.2 | 3.4 | 3.8 | 4.9 | 8.4 | 13.1 | 14.8 | 11.7 | 12.7 | 5.9 | 6.4 | 5.9 | 5.3 |
| 法国 | 3.9 | 4.1 | 5.4 | 8.0 | 7.8 | 6.8 | 6.1 | 6.0 | 4.4 | 3.2 | 3.8 | 3.5 | 3.3 |
| 意大利 | 2.4 | 2.7 | 2.2 | 2.7 | 2.5 | 2.6 | 2.5 | 2.7 | 2.7 | 2.3 | 2.9 | 2.8 | 2.9 |
| 俄罗斯／苏联 | 4.7 | 5.4 | 5.4 | 7.1 | 7.8 | 8.9 | 8.3 | 5.3 | 9.0 | 10.7 | 14.8 | 14.4 | 14.8 |
| 美国 | | 0.7 | 2.7 | 7.1 | 14.7 | 23.7 | 31.9 | 39.3 | 31.4 | 44.7 | 35.1 | 33.0 | 31.5 |
| 日本 | 3.9 | 3.4 | 2.7 | 2.7 | 2.5 | 2.4 | 2.7 | 3.3 | 5.2 | 2.9 | 5.1 | 8.8 | 9.1 |
| 第三世界 | 73.2 | 67.3 | 60.9 | 36.7 | 20.9 | 11.1 | 7.5 | 7.2 | 7.2 | 6.5 | 8.5 | 9.9 | 12.0 |
| 中国 | 33.1 | 33.3 | 29.9 | 19.5 | 12.5 | 6.3 | 3.5 | 3.4 | 3.1 | 2.3 | 3.5 | 3.9 | 5.0 |
| 印度／巴基斯坦 | 24.4 | 19.7 | 17.9 | 8.4 | 2.8 | 1.7 | 1.4 | 1.9 | 2.4 | 1.7 | 1.8 | 2.1 | 2.3 |
| 世界 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

□□□□□□13.1




**□13.1 1750—1980□□□□□□□□□□□□□13.2□□□**

□□□□□□□□□“□□□□”□1750□□□□□□□27%□1860□□63%□1953□□94%□□□□□□□□□□□□□□□□□□□□□□□□□□□□1750□□□□□□□□□□□2%□1880□□□□20%□□□

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[illegible]1708[illegible]Montgofier[illegible]Antonnay[illegible]1783[illegible]13.3[illegible]1837[illegible][5][illegible]

**[illegible]13.3[illegible]1700—1831[illegible]**

| 年份 | 国民生产增长率 | | 人均国民生产增长率 | |
|---|---|---|---|---|
| | 国民生产（每年%） | 隐式倍增时间（年） | 人均国民生产（每年%） | 隐式倍增时间（年） |
| 1700—1760 | 0.69 | 100 | 0.31 | 223 |
| 1760—1780 | 0.70 | 99 | 0.01 | 6931 |
| 1780—1801 | 1.32 | 53 | 0.35 | 198 |
| 1801—1831 | 1.97 | 36 | 0.52 | 134 |

[illegible]N. F. R. [illegible]1985[illegible]45[illegible]
[illegible]“[illegible]”[illegible]

[illegible]19[illegible]N. F. R. [illegible]18[illegible][6][illegible]

[illegible]

[illegible]—[illegible]18[illegible]——[illegible]——[illegible][7]

18[illegible][8][illegible]18[illegible]——[illegible]

[illegible]25%——30%[illegible][9][illegible]17[illegible]50[illegible]“[illegible]1/4[illegible]”[illegible]·[illegible]Gregory King[illegible]1688[illegible]40%[illegible]“[illegible]”[illegible]“[illegible]”[illegible][10][illegible]1700[illegible]10%[illegible]——[illegible]·[illegible]42‰[illegible][11]

18[illegible]37%[illegible]20%[illegible]16%[illegible]20%[illegible]7%[illegible][12][illegible]50%[illegible]

## [illegible]

[illegible]18—19[illegible]

[illegible]18[illegible]17—18[illegible]

[illegible]

[illegible]16[illegible]——[illegible]——[illegible]18[illegible]18[illegible]

[illegible]W.G. [illegible]Hoskins[illegible]·[illegible]Wigston Magna[illegible]“[illegible]”[illegible]

> [illegible]16[illegible]——[illegible][13]

[illegible]·[illegible]1765[illegible]60[illegible][14]

[illegible]100[illegible]17[illegible]12%[illegible]57%[illegible][15][illegible]

[illegible]“[illegible]”——[illegible]·[illegible]“[illegible]1750[illegible]”[16]

[illegible]17[illegible]18[illegible]19[illegible]

[illegible]“[illegible]”[illegible]——[illegible]——[illegible]

[illegible]1700—1800[illegible]37%[illegible][17][illegible]1700—1850[illegible]3[illegible]61%[illegible]1700[illegible]29%[illegible]1840[illegible]1840[illegible]1750[illegible]1170[illegible][18][illegible]13.4[illegible]

**[illegible]13.4 [illegible]1700—1850[illegible]**

| | 1700 | 1750 | 1800 | 1850 |
|---|---|---|---|---|
| 农作物 | | | | |
| 谷物（蒲式耳） | 65 | 88 | 131 | 181 |
| 肉类（磅） | 370 | 665 | 888 | 1356 |
| 羊毛（磅） | 40 | 60 | 90 | 120 |
| 奶酪（磅） | 61 | 84 | 112 | 157 |
| 1815 年的批发价格（英镑） | | | | |
| 谷物和土豆 | 19 | 25 | 37 | 56 |
| 畜牧产品 | 21 | 34 | 51 | 79 |
| 总计 | 40 | 59 | 88 | 135 |

[illegible]·[illegible]1700-1820[illegible]2[illegible]1994[illegible]81[illegible]R. C. [illegible]1700[illegible]·[illegible]Roderick Floud[illegible]·[illegible]Donald McCloskey[illegible]2[illegible]1994[illegible]1[illegible]109[illegible]
[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

18[illegible]18[illegible]19[illegible][19][illegible]

[illegible]——[illegible]

[illegible]18[illegible]1651[illegible]1660[illegible]

17[illegible]

## [illegible]

[illegible]“[illegible]”[illegible]18[illegible]19[illegible]4000[illegible]

[illegible]17[illegible]18[illegible]18[illegible]1709[illegible]1500—1760[illegible]10[illegible]5[illegible]·[illegible]Abraham Darby[illegible]Shropshire[illegible]Coalbrookdale[illegible][20][illegible]11[illegible][21][illegible]18[illegible]60[illegible]1784[illegible]·[illegible]Henry Cort[illegible]18[illegible]10[illegible][22]

[illegible]16[illegible][23][illegible]·[illegible]Denis Papin[illegible]1679[illegible]·[illegible]Thomas Savery[illegible]1698[illegible]·[illegible]Thomas Newcomen[illegible]1717[illegible]

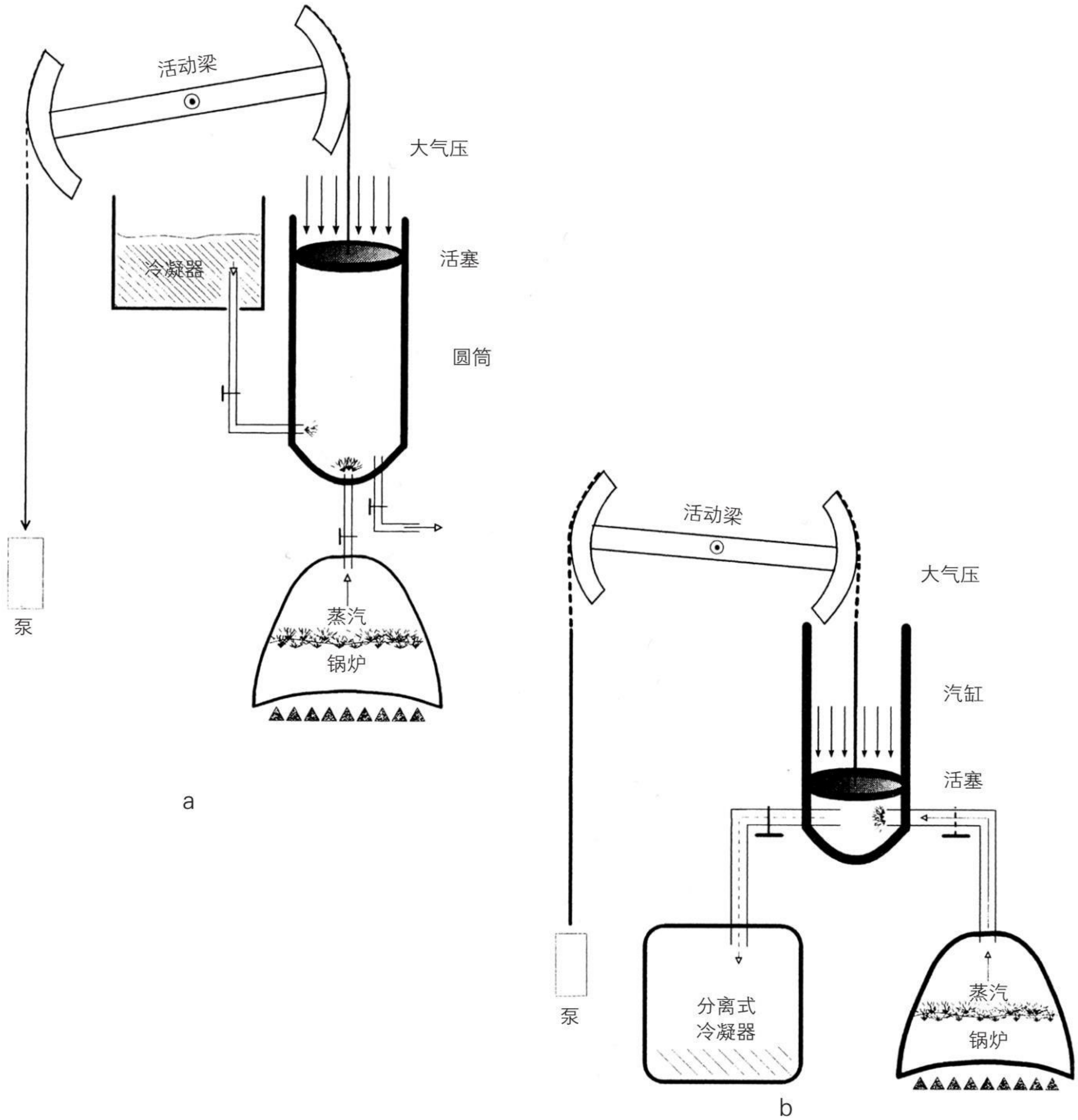
[illegible]1742[illegible]18[illegible]

[illegible]1702[illegible]1718[illegible]·[illegible]Thomas Lombe[illegible]18[illegible]30[illegible]1733[illegible]18[illegible]30[illegible]18[illegible]70[illegible]80[illegible]·[illegible]Richard Arkwright[illegible]·[illegible]James Hargreaves[illegible]·[illegible]Samuel Crompton[illegible]——[illegible][24][illegible]1780[illegible]20[illegible]85%[illegible][25]

[illegible][26][illegible]16[illegible][27][illegible]

[illegible]—[illegible]

[illegible]·[illegible]18[illegible]60[illegible]
[illegible]
[illegible]13.2[illegible]
[illegible]1790[illegible]1800
[illegible]200—300[illegible]
[illegible]6000[illegible]5000[illegible]
[illegible]
[illegible]
[illegible]




**[illegible]13.2 18**[illegible]

a.[illegible]1712[illegible]“[illegible]”[illegible]b. 1769[illegible]·[illegible]·E.[illegible]·[illegible]·[illegible]1999[illegible]282[illegible]13.1[illegible]284[illegible]13.2[illegible]1999[illegible]

[illegible]

[illegible]——[illegible]18[illegible]60[illegible]1802[illegible]·[illegible]Richard Trevithick[illegible]30[illegible]1825[illegible]

[illegible]·[illegible]“[illegible]”[illegible]17[illegible][28][illegible]Josephy Needlman[illegible]“[illegible]‘[illegible]’[illegible]‘[illegible]’”[illegible][29][illegible]—[illegible]

**[illegible]13.5 [illegible]1770—1831[illegible]**

| 部门 | 产品 | 1770 | 1801 | 1831 |
|---|---|---|---|---|
| 纺织 | 棉花 | 0.6 | 9.2 | 25.3 |
| | 羊毛 | 7.0 | 10.2 | 15.9 |
| | 麻 | 1.9 | 2.6 | 5.0 |
| | 丝绸 | 1.0 | 2.0 | 5.8 |
| 煤和金属 | 煤 | 0.9 | 2.7 | 7.9 |
| | 铁 | 1.5 | 4.0 | 7.6 |
| | 铜 | 0.2 | 0.9 | 0.8 |
| 建筑 | 住房 | 2.4 | 9.3 | 26.5 |
| 消费品 | 啤酒 | 1.3 | 2.5 | 5.2 |
| | 皮革[1] | 5.1 | 8.4 | 9.8 |
| | 肥皂 | 0.3 | 0.8 | 1.2 |
| | 蜡烛 | 0.5 | 1.0 | 1.2 |
| | 纸 | 0.1 | 0.6 | 0.8 |
| 总计 | | 22.8 | 54.2 | 113.0 |

[illegible]·[illegible]1700—1820[illegible]2[illegible]1994[illegible]38[illegible][30]

[illegible]·[illegible]

[illegible]……[illegible]……[illegible]19[illegible]1851[illegible]19[illegible][31]

[illegible][32]

[illegible]13.5[illegible]·[illegible]

[illegible]——[illegible]——[illegible]“[illegible]”[illegible][33]

[illegible]18[illegible]·[illegible]“[illegible]”[illegible][34]18[illegible]——[illegible]

## [illegible]

[illegible]17—18[illegible]19[illegible]
[illegible]“[illegible]”[illegible]·[illegible]

> [illegible]1000[illegible]——[illegible][35]

[illegible][36][illegible]17[illegible]18[illegible]“[illegible]”[illegible]1000[illegible]

[illegible]

> [illegible]1750[illegible]18[illegible][37]

[illegible]

[illegible][38][illegible]19[illegible]

[illegible]“[illegible]”[illegible]——[illegible]“[illegible]”[39]——[illegible]

[illegible]1790[illegible]·[illegible]“[illegible]”[illegible][40]

[illegible]

> [illegible]……[illegible]“[illegible]”[illegible][41]

[illegible] E. P. [illegible][42][illegible]

[illegible]·[illegible]Karl Polanyi[illegible][43]

[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

## [illegible]

[illegible]

[illegible]“[illegible]”[illegible]——[illegible]

[illegible][44][illegible]·[illegible]·[illegible]·[illegible][45]

[illegible]“[illegible]·[illegible]18[illegible]19[illegible]……[illegible]”[46][illegible]19[illegible]

[illegible]19[illegible]

[illegible]“[illegible]”“[illegible]”[illegible]

## [illegible]

[illegible]19[illegible]30[illegible]19[illegible]13.5[illegible]19[illegible]30[illegible][47][illegible]19[illegible]70[illegible]

[illegible]——[illegible]——[illegible]·[illegible]“[illegible]”[48][illegible]

[illegible]·[illegible]20[illegible]60[illegible][49][illegible]19[illegible]

[illegible]20[illegible]19[illegible]19[illegible]

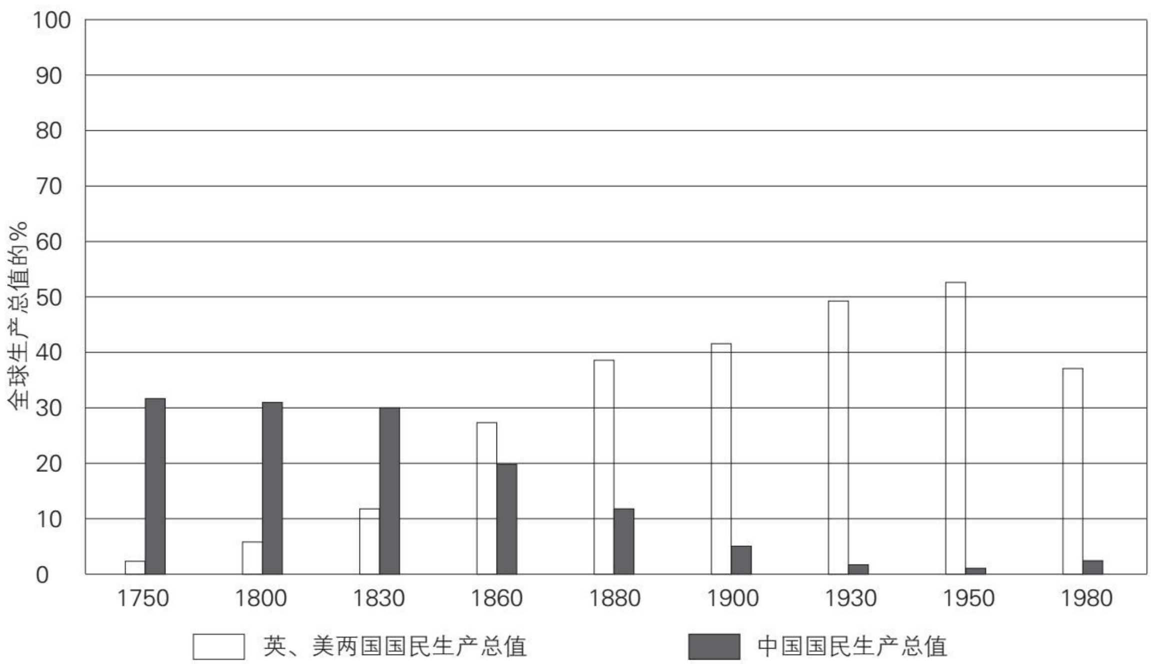
[illegible]“[illegible]”[illegible][50][illegible]18[illegible]19[illegible]19[illegible]20—30[illegible]19[illegible]70[illegible]·[illegible]——[illegible]——[illegible]

[illegible]1900[illegible]24%[illegible]19%[illegible]13%[illegible]13.2[illegible][51][illegible]19[illegible]20[illegible]

[illegible]——[illegible]19[illegible][52][illegible]

1842□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□19□□□□□□□□
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19□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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□□□□33%□□□1900□□6%□□1950□□2%□□□□□□□□1800□□20%
□□□1900□□2%□20□□□□□□□□1750□□□□□□□□□□□□□□□□□□□
□□□□□75%□□20□□□□□□15%□□□□□□□□□□19□□□□□□□□□□
□□1860□□37%□□□1880□□21%□□□20□□□□□□□□□□□7%□□□□
13.3□□13.3□□




**□13.3 “□□□□□”□1750—1980□□□□□□□□□□□□□□□□□□□□□□□□□□□□□13.2□□□**

20□□□□□□□□□□□□“□□”□“□□”□□□□□□□□□□□□19□□□□□·□□□
□□

[illegible]“[illegible]”[illegible]“[illegible]”[illegible][53]

19[illegible]70[illegible]15[illegible][54]

[illegible]——[illegible]19[illegible]20[illegible][55][illegible]——[illegible]——[illegible]

## [illegible]

[illegible]18[illegible]19[illegible]18[illegible]

[illegible] 18 [illegible] 20 [illegible] 19 [illegible] 19 [illegible]

## [illegible]

[illegible] 1969 [illegible]·[illegible] 1750 [illegible] 1969 [illegible]·[illegible] 1700—1820 [illegible] 2 [illegible] 1994 [illegible]·[illegible] Pat Hudson [illegible] 1992 [illegible] E. A. [illegible] 1988 [illegible] N. F. R. [illegible] 1985 [illegible]·[illegible] 1997 [illegible]·[illegible] 1993 [illegible] 1780—1914 [illegible] 1978 [illegible]·[illegible]·[illegible] 2000 [illegible] 1997 [illegible]·[illegible]·[illegible] 1998 [illegible] 18 [illegible]·[illegible] 1990 [illegible]·[illegible]·[illegible] 1999 [illegible]·[illegible] 990—1992 [illegible] 1992 [illegible]·[illegible]·[illegible] 1989 [illegible]·[illegible] 2001 [illegible]·[illegible] Chris Bayley [illegible] 2003 [illegible]“[illegible]”19 [illegible]

[1] [illegible]·[illegible]19[illegible]1981[illegible]3[illegible]

[2] [illegible]·[illegible]·[illegible]·[illegible]1993[illegible]2[illegible]“[illegible]”[illegible]5[illegible]——[illegible]1997[illegible]279[illegible]“[illegible]1780—1880[illegible]”

[3] [illegible]·[illegible]Alexander Geschenkron[illegible]1962[illegible]

[4] [illegible]·[illegible]·[illegible]1780—1914[illegible]20[illegible]1978[illegible]196[illegible]

[5] [illegible]·[illegible]Cary Hwake[illegible]·[illegible]54[illegible]

[6] N. F. R.[illegible]1985[illegible]115[illegible]

[7] [illegible]·[illegible]1990[illegible]100—109[illegible]

[8] [illegible]·[illegible]125—155[illegible]

[9] [illegible]·[illegible]·[illegible]·[illegible]1979[illegible]108[illegible]

[10] [illegible]·[illegible]·[illegible]108[illegible]·[illegible]13[illegible]

[11] [illegible]·[illegible]11[illegible]

[12] [illegible]13[illegible]16[illegible]

[13] W. G. [illegible]1965[illegible]269[illegible]·[illegible]1700—1820[illegible]2[illegible]1994[illegible]85[illegible]

[14] [illegible]·[illegible]2[illegible]1987[illegible]206[illegible]

[15] [illegible]1700—1820[illegible]80[illegible]

[16] [illegible]1969[illegible]28—29[illegible]

[17] [illegible]62—63[illegible]

[18] [illegible]62[illegible]121[illegible]

[19] [illegible]18[illegible]0.2%——0.3%[illegible]1801—1830[illegible]0.7%[illegible]1831—1860[illegible]1.0%[illegible]2[illegible]76—77[illegible]81[illegible]

[20] [illegible]·E.[illegible]James E. McClellan III[illegible]·[illegible]Harold Dorn[illegible]·[illegible]1999[illegible]279[illegible]

[21] [illegible]·[illegible]Arnold Pacey[illegible]1990[illegible]113[illegible]

[22] [illegible]280—281[illegible]

[23] [illegible]84—85[illegible]

[24] [illegible]96—98[illegible]

[25] [illegible]111[illegible]

[26] [illegible]·[illegible]2[illegible]1995[illegible]124—125[illegible]

[27] [illegible]125[illegible]

[28] [illegible]1990[illegible]106[illegible]117—119[illegible]

[29] [illegible]1970[illegible]202[illegible]·[illegible]George Basalla[illegible]1988[illegible]40[illegible]

[30] [illegible]Lather[illegible]——[illegible]

[31] [illegible]·[illegible]1700—1914[illegible]2[illegible]1983[illegible]124—125[illegible]287—289[illegible]

[32] [illegible]·[illegible]1997[illegible]50—51[illegible]

[33] [illegible]50—51[illegible]

[34] [illegible]·[illegible]87[illegible]

[35] [illegible]·[illegible]990—1992[illegible]1992[illegible]96[illegible]

[36] [illegible]·[illegible]“[illegible]”[illegible]990—1992[illegible]3[illegible]

[37] [illegible]990—1992[illegible]103—104[illegible]

[38] [illegible]990—1992[illegible]106—107[illegible]

[39] [illegible]·[illegible]——[illegible]1985[illegible]·[illegible]

[40] [illegible]990—1992[illegible]110[illegible]

[41] [illegible]——[illegible]152[illegible]

[42] [illegible]E. P. [illegible]1975[illegible]·[illegible]1968[illegible]

[43] [illegible]·[illegible]1957[illegible]

[44] [illegible]·[illegible]John Merson[illegible]1989[illegible]83[illegible]

[45] [illegible]·[illegible]70[illegible]

[46] [illegible]221[illegible]

[47] [illegible]98[illegible]

[48] [illegible]134—135[illegible]

[49] [illegible]

[50] [illegible]·[illegible]300[illegible]B. L. [illegible]1990[illegible]55—67[illegible]

[51] [illegible]·[illegible]Richard Barff[illegible]20[illegible]R. J. [illegible]·L. [illegible]·L. [illegible]1995[illegible]51[illegible]

[52] [illegible]·[illegible]Mike David[illegible]2001[illegible]51[illegible]

[53] [illegible]·[illegible]16[illegible]3[illegible]

[54] [illegible]·[illegible]115[illegible]

[55] [illegible]1997[illegible]

# [illegible]14[illegible]
# 20[illegible]

[illegible]20[illegible]

[illegible]

[illegible][1]

## [illegible]

20[illegible]20[illegible]·[illegible]“[illegible]”20[illegible]1994[illegible]20[illegible]20[illegible]·[illegible]“[illegible]20[illegible]”[illegible][2]

[illegible]20[illegible]20[illegible]20[illegible]

[illegible]

[illegible] 20 [illegible]

[illegible] · [illegible] “ [illegible] —— [illegible] —— [illegible] ”[3] [illegible] D. J. [illegible] Bradley [illegible] “ [illegible] ” [illegible] 40 [illegible] 10 [illegible] 400 [illegible] 4000 [illegible][4]

1940 [illegible] · [illegible] 20 [illegible]

> [illegible] Klee [illegible] “ [illegible] ” [illegible] *Angelus Novus* [illegible][5]

[illegible] · [illegible][6]

[illegible] 20 [illegible] 10 [illegible] 4000 [illegible]

[illegible]14.1[illegible][7][illegible]1900[illegible]16[illegible]60[illegible]10[illegible]10[illegible]5[illegible]10[illegible]80[illegible]40[illegible]

# [illegible]

## 20[illegible]

[illegible]18[illegible]20[illegible]1900—2000[illegible]3[illegible]4[illegible]4[illegible]20[illegible][8]20[illegible]

[illegible]20[illegible]19[illegible][9][illegible]19[illegible]20[illegible][10][illegible]·[illegible]13.1[illegible]13.2[illegible]19[illegible]20[illegible]

**[illegible]14.1 1900—2000[illegible]**

| 年代 | 人口（10 亿） |
|---|---|
| 1900 | 1.634 |
| 1910 | 1.746 |
| 1920 | 1.857 |
| 1930 | 2.036 |
| 1940 | 2.267 |
| 1950 | 2.515 |
| 1960 | 3.019 |
| 1970 | 3.698 |
| 1980 | 4.450 |
| 1990 | 5.292 |
| 2000 | 6.100 |

[illegible]·[illegible]-[illegible]1992[illegible]147[illegible]1910[illegible]2000[illegible]·R. [illegible]W. W. [illegible]2001[illegible]212[illegible]

[illegible]——[illegible]——[illegible]20[illegible]70[illegible]80[illegible]

[illegible]21[illegible]·[illegible]Manuel Castells[illegible]20[illegible]20[illegible]“[illegible]”[illegible][11][illegible][12][illegible]2000[illegible]14.2[illegible]

**□14.2 □□□□□□□□□□□□□2000□1□□**

| 排位 | 政治单元 | 公司 | 价值（10 亿美元） |
| --- | --- | --- | --- |
| 1 | 美国 |  | 15013 |
| 2 | 日本 |  | 4224 |

| 排位 | 政治单元 | 公司 | 价值（10 亿美元） |
| --- | --- | --- | --- |
| 3 | 英国 | | 2775 |
| 4 | 法国 | | 1304 |
| 5 | 德国 | | 1229 |
| 6 | 加拿大 | | 695 |
| 7 | 瑞士 | | 662 |
| 8 | 荷兰 | | 618 |
| 9 | 意大利 | | 610 |
| 10 | | 微软（美） | 546 |
| 11 | 香港 | | 536 |
| 12 | | 通用电器（美） | 498 |
| 13 | 澳大利亚 | | 424 |
| 14 | 西班牙 | | 390 |
| 15 | | 思科系统（美） | 355 |
| 16 | 中国台湾 | | 339 |
| 17 | 瑞典 | | 318 |
| 18 | | 英特尔（美） | 305 |
| 19 | | 埃克森–美孚（美） | 295 |
| 20 | | 沃尔玛（美） | 289 |
| 21 | 韩国 | | 285 |
| 22 | 芬兰 | | 276 |
| 23 | | 日本航空（日） | 274 |
| 24 | | 美国在线–时代华纳 | 289[1] |
| 25 | 南非 | | 232 |
| 26 | | 诺基亚（芬兰） | 218 |
| 27 | 希腊 | | 217 |
| 28 | | 德国电气（德） | 218 |
| 29 | | IBM（美） | 213 |
| 30 | 巴西 | | 194 |

[illegible]2000[illegible]1[illegible]15[illegible][13]

[illegible]19[illegible]20[illegible]1900—1950[illegible]2[illegible]5[illegible]50[illegible]29[illegible]20[illegible]20[illegible]1995—1998[illegible]1900[illegible]1[illegible][14]

[illegible]

[illegible]19[illegible]·[illegible]“[illegible]”[illegible]——[illegible]19[illegible]20[illegible]19[illegible]20[illegible]20[illegible]——[illegible]·[illegible]1922[illegible]——[illegible]20[illegible]

[illegible]

[illegible]19[illegible]70[illegible]“[illegible]”[illegible]

19 · · John Maynard Keynes 20

20

[15]

1990 100 80 100 80 65 100 60 [16]

[illegible]20[illegible]

## [illegible]

[illegible]20[illegible]20[illegible]

20[illegible]20[illegible]

[illegible]1900[illegible]1500[illegible]1998[illegible]6600[illegible]——[illegible]35[illegible]66[illegible][17][illegible]14.3[illegible]14.4[illegible]2000[illegible]34 100[illegible]27 680[illegible]3580[illegible]200[illegible]840[illegible]450[illegible]210[illegible]14.3[illegible]1%[illegible]1.5%[illegible]14.4[illegible]

**[illegible]14.3 2000[illegible]**

| 国家或地区 | 收入（美元） |
| --- | --- |
| 世界 | 5170 |
| 美国 | 34 100 |
| 高收入国家平均值 | 27 680 |
| 布基纳法索 | 210 |
| 撒哈拉以南非洲 | 470 |
| 印度 | 450 |
| 中国 | 840 |
| 巴西 | 3580 |
| 拉丁美洲和加勒比海地区 | 3670 |

□□□□□□□□□□□□□□□□□□□□2002□□□□1.1□□□□□□□18—20□

**□14.4 2000□□□□□**

| 国家或地区 | 期望寿命（岁） | |
| --- | --- | --- |
| | 男子 | 女子 |
| 世界 | 65 | 69 |
| 美国 | 74 | 80 |
| 高收入国家平均值 | 75 | 81 |
| 布基纳法索 | 44 | 45 |
| 撒哈拉以南非洲 | 46 | 47 |
| 印度 | 62 | 63 |
| 中国 | 69 | 72 |
| 巴西 | 64 | 72 |
| 拉丁美洲和加勒比海地区 | 67 | 74 |

□□□□□□□□□□□□□□□□□□□□2002□□□□1.5□□□□□□□□□32—34□

□20□□□□□10□□□□□□□□□□□□1960□□□□□20%□□□□□□□□□□□20%□□□□□□30□□1991□□□□□□61□□[18]□□□□□□□□□□□□□□□□□□20□□70□□□□□□□□□□□□□□□□□□□□□□□□□90□□□□□□□□□□□□□□□□□□□□4.5□□□□□□□□□□□□□□1100□□□□□□□□□□□□□□□□□[19]

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□90□□□□□□□□□26%□□□□HIV□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□[20]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□·□□□□Paul Harrison□□□□“□□□□□□□□□□□□□□□……□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”□[21]□20□□90□□□□□□□□□□8□□□□□□□□□□□14%□□□□□□□12□□□□□□□□□□□20%□□□□□□□□□□□□□□□[22]□14.5□□□1994□□□□□□□□□

**□14.5 1994□□□□□□□□□□□**

| 地区 | 人口（百万） | 自然增长（%／年） | 出生率（‰） | 死亡率（‰） | 期望寿命（出生时） | 人均 GDP（1992 年，美元） |
|---|---|---|---|---|---|---|
| 世界 | 5607 | 1.6 | 25 | 9 | 65 | 4 340 |
| 比较发达 | 1164 | 0.3 | 12 | 10 | 75 | 16 610 |
| 欠发达 | 4443 | 1.9 | 28 | 9 | 63 | 950 |
| 非洲 | 700 | 2.9 | 42 | 13 | 55 | 650 |
| 亚洲 | 3392 | 1.7 | 25 | 8 | 64 | 1 820 |
| 拉丁美洲和加勒比海地区 | 470 | 2.0 | 27 | 7 | 68 | 2 710 |
| 欧洲 | 728 | 0.1 | 12 | 11 | 73 | 11 990 |
| 北美 | 290 | 0.7 | 16 | 9 | 76 | 22 840 |
| 大洋洲 | 28 | 1.2 | 20 | 8 | 73 | 13 040 |

[illegible]·[illegible]Allen Findlay[illegible]20[illegible]R. J. [illegible]·J. [illegible]·J. [illegible]1995[illegible]1994[illegible]

## [illegible]

[illegible]——[illegible]emergency granaries[illegible]13.2[illegible]20[illegible]18[illegible]1800[illegible]97%[illegible]2[illegible]20[illegible]75%[illegible]1980[illegible]60%[illegible]2000[illegible]2[illegible][23][illegible]1800[illegible]20%[illegible]——[illegible]——[illegible]·[illegible]“20[illegible]”[24]

[illegible]·[illegible]20[illegible]80[illegible]Sahel[illegible]

[illegible]·[illegible]60[illegible]Moumouni[illegible]

> [illegible]12[illegible]34[illegible]5[illegible]……[illegible]……[illegible]5/6[illegible]12[illegible]

[illegible]

> [illegible]50[illegible][25]

[illegible]1988[illegible]“[illegible]”[illegible]8.8%[illegible][26]

[illegible]20[illegible]

[illegible]

## [illegible]

[illegible]1793[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible][27][illegible]

[illegible]——[illegible]19[illegible]40[illegible]1839[illegible]“[illegible]”[28][illegible]1842[illegible]·[illegible]20[illegible]20[illegible]·[illegible]“[illegible]”[illegible]

[illegible]20[illegible][29][illegible]20[illegible]30[illegible]

[illegible]1949[illegible]——[illegible]20[illegible]24%[illegible]2%[illegible][30][illegible]

[illegible]——[illegible]20[illegible]30[illegible]50[illegible]——[illegible]·[illegible]

[illegible]——[illegible]20[illegible]70[illegible]——[illegible]……[illegible]“[illegible]”[illegible]

[illegible]15[illegible]20[illegible]80[illegible][31]

[illegible]20[illegible]90[illegible]

[illegible]

[illegible]20[illegible]

## [illegible]

[illegible]100[illegible]“[illegible]”[illegible]·[illegible]William Eckhardt[illegible]1500[illegible]370[illegible]

[illegible]16[illegible]160[illegible]17[illegible]18[illegible]610[illegible]700[illegible]19[illegible]1940[illegible]20[illegible]1.097[illegible]1900[illegible]14.6[illegible][32][illegible]5350[illegible]1986[illegible]7000[illegible]180[illegible]TNT[illegible]——[illegible]3.6[illegible][33][illegible]

**[illegible]14.6 1500—1999[illegible]**

| 年份 | 战争死亡（百万） | 每 1000 人死亡数 |
|---|---|---|
| 1500—1599 | 1.6 | 3.2 |
| 1600—1699 | 6.1 | 11.2 |
| 1700—1799 | 7.0 | 9.7 |
| 1800—1899 | 19.4 | 16.2 |
| 1900—1999 | 109.7 | 44.4 |

[illegible]·R. [illegible]1999[illegible]1999[illegible]153[illegible]·[illegible]3000[illegible]22[illegible]4[illegible]1991[illegible]12[illegible]437—443[illegible]·[illegible]·[illegible]Ruth Leger Sivad[illegible]1996[illegible]1996[illegible]

[illegible]1900[illegible]20[illegible]80[illegible]275[illegible][34][illegible]1945—2000[illegible]9[illegible]100[illegible]10%[illegible]13%[illegible][35][illegible]20[illegible]90[illegible]40%[illegible]2001[illegible]9[illegible]11[illegible]“[illegible]”[illegible][36][illegible]

## [illegible]

20[illegible]“[illegible]300[illegible]”[37]

[illegible]6.1[illegible]20[illegible]20[illegible]60 000—90 000[illegible]20[illegible]“[illegible]”[illegible]net primary productivity[illegible]25%[illegible]40%[illegible]140[illegible]

[illegible]1966[illegible]20%[illegible][38][illegible]·[illegible]Richard Leakey[illegible]65%[illegible][39]

[illegible]120[illegible]20[illegible]1950[illegible]9400[illegible]2.6[illegible]40%[illegible][40][illegible]

[illegible]·[illegible]“[illegible]”[41][illegible]450℃[illegible]9℃[illegible]190—200ppm[illegible]1800[illegible]280ppm[illegible]350 ppm[illegible]2150[illegible]550—600 ppm[illegible]

[illegible]20[illegible]20[illegible]2050[illegible]2.5℃[illegible]——[illegible][42]

[illegible]

[illegible]——[illegible]

[illegible]·[illegible]20[illegible][43][illegible][44]

20[illegible]90[illegible]·W.[illegible]·C.[illegible]10[illegible]1[illegible]1985[illegible]25%[illegible]50%[illegible]75%[illegible]14.7[illegible]1985[illegible]50%[illegible]7[illegible]1945—1985[illegible]40[illegible]10000[illegible][45][illegible]——[illegible]——[illegible]50%[illegible]20[illegible]6.1[illegible]20[illegible]

**[illegible]14.7 [illegible]1[illegible]20[illegible]80[illegible]**

| 转型的类型 | 四分位值（与 1985 年相比） | | |
|---|---|---|---|
| | 25% | 50% | 75% |
| 森林消失的地区 | 1700 | 1850 | 1915 |
| 陆地脊椎动物的多样性 | 1790 | 1880 | 1910 |
| 取水量 | 1925 | 1955 | 1975 |
| 人口规模 | 1850 | 1950 | 1970 |
| 碳释放 | 1815 | 1920 | 1960 |
| 硫释放 | 1940 | 1960 | 1970 |
| 磷释放 | 1955 | 1975 | 1980 |
| 氮释放 | 1970 | 1975 | 1980 |
| 铅释放 | 1920 | 1950 | 1965 |
| 四氯化碳生产 | 1950 | 1960 | 1970 |

[illegible]·W. [illegible]B. L. [illegible]·C. [illegible]300[illegible]B·L·[illegible]1990[illegible]7[illegible]

[illegible]20[illegible]20[illegible]——[illegible]

# [illegible]

20[illegible]

[illegible]20[illegible]21[illegible]20[illegible]20[illegible]

## [illegible]

[illegible]·R. [illegible]2000[illegible]·[illegible]1994[illegible]·[illegible]3[illegible]1996——1998[illegible]20[illegible]B. L.[illegible]1990[illegible]·[illegible]1984[illegible]——[illegible]·[illegible]David Held[illegible]1999[illegible]·[illegible]1992[illegible]·[illegible]21[illegible]1994[illegible]

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[1] [illegible]·[illegible]Yehudi Menuhin[illegible]E. J. [illegible]1994[illegible]2[illegible]·[illegible]Giovanna Borgese[illegible]Mi pare un secolo: Ritrati e parole di centosei protagonisti del Novecento[illegible]1992[illegible]

[2] [illegible]·R. [illegible]

[3] [illegible]·[illegible]51[illegible]

[4] D. J. [illegible]·[illegible]Andrew Cliff[illegible]·[illegible]Peter Haggett[illegible]20[illegible]R. J. [illegible]·L. [illegible]·L. [illegible]1995[illegible]206—223[illegible]207[illegible]208[illegible]

[5] [illegible]·[illegible]Hannah Arendt[illegible]·[illegible]Harry Zohn[illegible]·[illegible]1970[illegible]9[illegible]259—260[illegible]

[6] [illegible]“[illegible]”[illegible]15[illegible]

[7] □□□·W. □□□Robert W. Kates□□B. L. □□□□□Turner II□□□□□·C. □□□□William C. Clark□□□□□□□□□□□□□□□□□□□□□□□□□□300□□□□□□□□□□□□□□□□□B. L. □□□□□□□□□□□□□□□□1990□□□□11□□

[8] □□□□□□□□□·R. □□□Lester R. Brown□□□□□□1999□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1999□□□□115—116□□

[9] □□□□□□□□□□□□□·R. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□55—67□□

[10] □□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□51□□

[11] □□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1□□□□□□□□□□□□□1996□□□□2□□□□□□□□□1997□□□□□□3□□□□□□□□□1998□□□

[12] □□□□□□□□□□□□□59□□

[13] □□□□□□□□——□□□

[14] □□□□□1999□□□□□□□□□10□□□□

[15] □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□·□□□□·□□□·□□□Richard and Lee Meadows Jantz□□□□□□□□□□J. J.□□□□Stambaugh□□“□□□□□□□□□1800□□□□□□□□□□”□□□□□□□□□□□□□□□2001□12□22□□

[16] □□·□□□□□□□Susan Christopherson□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□202□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□310—319□□

[17] □□□□□1999□□□□□□□□□10□□

[18] □□□·R. □□□□□1995□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1995□□□□176□□

[19] □□·□□□□Paul Kennedy□□□□21□□□□□□□□□□□□□□□□□1994□□□□215□□

[20] □□□□□1999□□□□□□□□□10□□

[21] □□·□□□□□□□□□□□□□□□□□□□□2□□□□□□□□□□□□□□□□□1981□□□□11□□

[22] □□□□□1999□□□□□□□□□12□□

[23] “98CD□□□□□□□□□□□□□”□□□□□□□□□□□□□□□□□□□□□□□1994—1997□□□“□□□”□□

[24] □□□□□□□□□□□□□□□289□□□□□□□□□□□□□□289—291□□

[25] □□·□□□□□□□□□□□□□□□□□□□□□67□□

[26] □□□□□1995□□□□□□□□□12□□

[27] □□□□□□□□□□□□□□□2□□□□□□□□□□□□□□□□□□□1975□□□□213□□

[28] [illegible]·[illegible]1990[illegible]143[illegible]·T. [illegible]Courtwright[illegible]31—36[illegible]

[29] [illegible]

[30] [illegible]·[illegible]Robert Lewis[illegible]1913—1945[illegible]R. W. [illegible]Davies[illegible]·[illegible]Mark Harrison[illegible]S. G. [illegible]Wheatcroft[illegible]1994[illegible]182—197[illegible]194[illegible]41[illegible]310[illegible]

[31] [illegible]·[illegible]1987[illegible]18—19[illegible]

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[33] [illegible]1999[illegible]154—155[illegible]

[34] [illegible]67[illegible]

[35] [illegible]1999[illegible]155—156[illegible]

[36] [illegible]1999[illegible]159[illegible]163[illegible]

[37] [illegible]·F. [illegible]“[illegible]”[illegible]21[illegible]

[38] [illegible]·[illegible]1998—1999[illegible]1998[illegible]128[illegible]

[39] [illegible]·[illegible]·[illegible]1995[illegible]45[illegible]

[40] [illegible]1999[illegible]116—117[illegible]123[illegible]

[41] [illegible]·[illegible]W. W. [illegible]2001[illegible]93[illegible]

[42] [illegible]·[illegible]21[illegible]112[illegible]2001[illegible]

[43] [illegible]1999[illegible]11[illegible]

[44] [illegible]1999[illegible]116[illegible]

[45] [illegible]12[illegible]

# [illegible]6[illegible]
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# [illegible]15[illegible]
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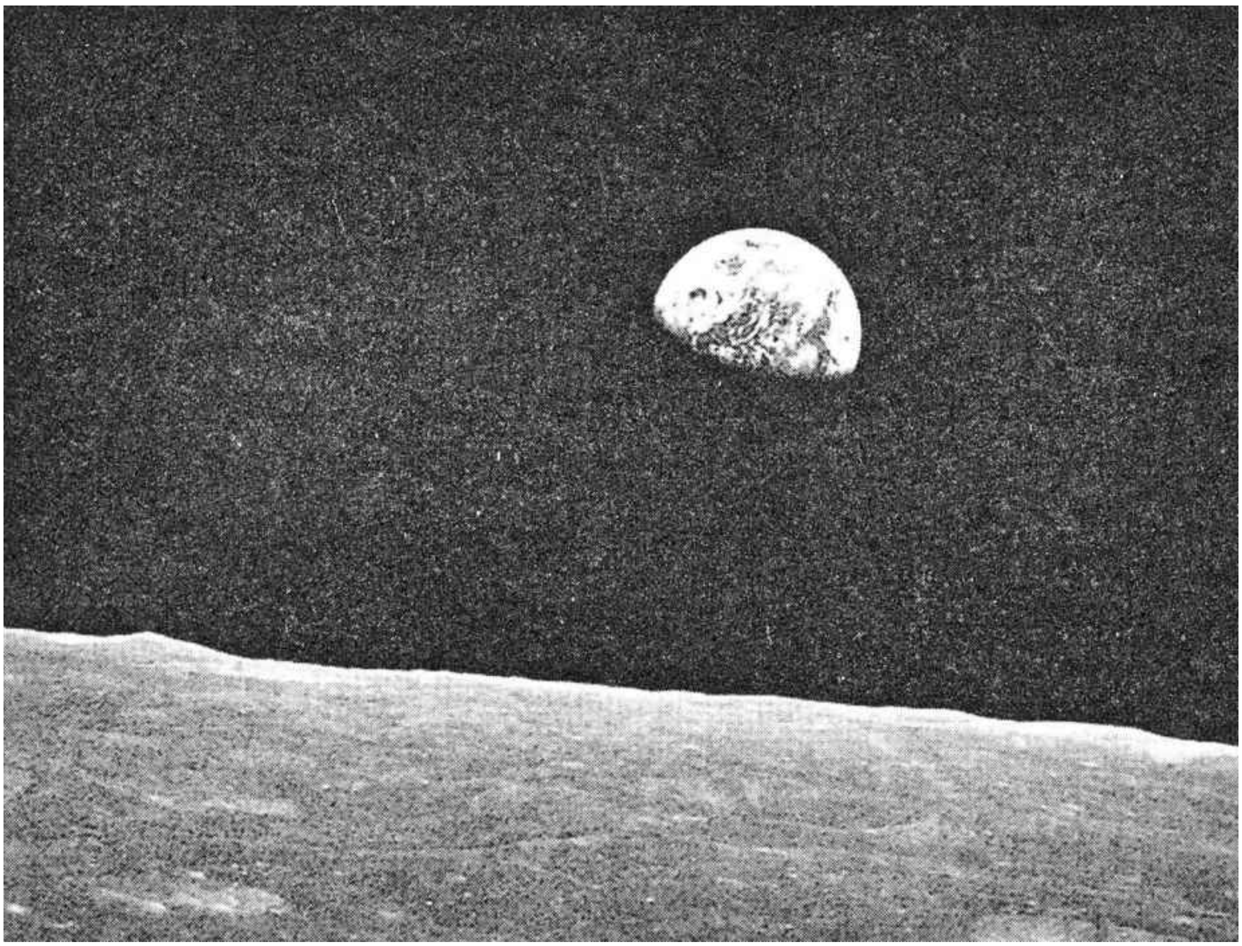
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[illegible]19[illegible]20[illegible]90[illegible]

[illegible]

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**□15.1** □□□□□□□□

□□□□□□□1968□12□□□□□8□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□·□□□□William Anders□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1998□□□□□□□□□□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”□□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□·□□□□□□□8□□□□□□□□2000□http://www.i20.uva.Nl/inhoud/gig/Apollo%208%20US. pdf□accesed April 2003□□□□□□□□□□□□□□

[illegible]·[illegible]20[illegible]“[illegible]1955[illegible]1952[illegible]10%[illegible]1966[illegible]1966[illegible]”[4][illegible]R. G.[illegible]Collinwood[illegible]“[illegible]”[5]

[illegible]1000[illegible]

[illegible]——[illegible]——[illegible]……[illegible]

[illegible]

[illegible]100[illegible]“[illegible]”[illegible]

## [illegible]

“[illegible]”[illegible]——[illegible]“[illegible]”[illegible]——[illegible]·[illegible]Jean-Marie Sawadogo[illegible]55[illegible]

[illegible]Pheleus[illegible]“[illegible]”[illegible]

[illegible]20[illegible]

[illegible]

[illegible]·[illegible]Herman Kahn[illegible]1966[illegible]·[illegible]Donella Meadows[illegible]1972[illegible][6][illegible]1[illegible]2[illegible]3[illegible]

[illegible]·[illegible]1992[illegible][7][illegible]3500[illegible]2000[illegible]1722[illegible]3000[illegible]600[illegible]6[illegible]Topknot[illegible]10[illegible]18[illegible]18[illegible]20[illegible]

[illegible] 1500 [illegible] Marquesas [illegible] 22.5 [illegible] 11 [illegible]

[illegible] 700 [illegible] ahus [illegible]

[illegible] 500 [illegible] 7000 [illegible] —— [illegible]

[illegible]

[illegible]3000[illegible]1000[illegible]

[illegible]1928[illegible]“[illegible]……[illegible]3[illegible]”[8][illegible]

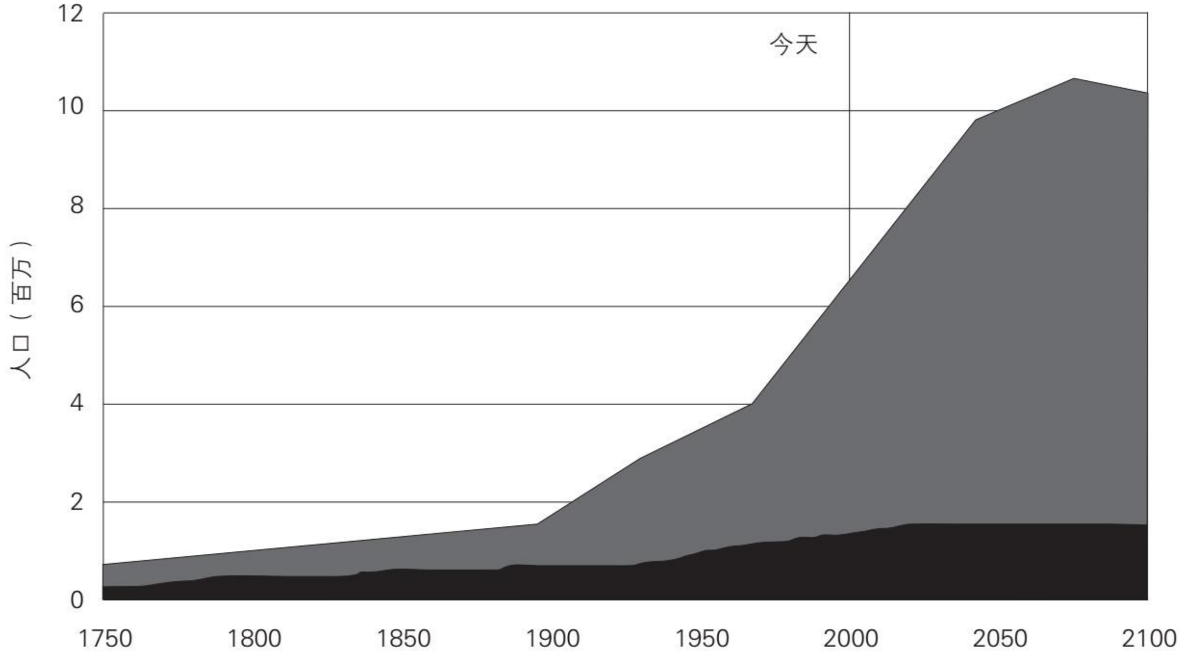
[illegible][9][illegible]

[illegible]20[illegible]——[illegible]

[illegible] 1998 [illegible] 33 [illegible][10] [illegible] 90 [illegible]——100 [illegible] 30 [illegible]——40 [illegible] 20 [illegible] 15.2 [illegible]

[illegible] 20 [illegible]

[illegible] 20 [illegible]



今天
人口（百万）
12
10
8
6
4
2
0
1750
1800
1850
1900
1950
2000
2050
2100

[illegible] 20[illegible]80[illegible] “[illegible]” [illegible] 1985 [illegible] 1987 [illegible] 1999 [illegible] 50% [illegible] 1999[illegible]5 [illegible] 80 [illegible] 2000 [illegible] 1990 [illegible] 32 [illegible] 10 [illegible] 1986 [illegible] 110 [illegible] 1996 [illegible] 16 [illegible]

[illegible] ·[illegible] “[illegible] 1979 [illegible] 1987 [illegible] 1988 [illegible] 60% [illegible] 1990 [illegible]” [12]

[illegible] —— [illegible] ·[illegible]· [illegible] 20[illegible]30 [illegible]

[illegible]——[illegible]

[illegible]“[illegible]”[illegible]——[illegible]——[illegible]

[illegible]

## [illegible]

[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible][13][illegible]

[illegible]Icarus[illegible][14][illegible]——[illegible]

[illegible]

[illegible]5000[illegible]

[illegible]——[illegible]——[illegible]100[illegible]——120[illegible]·[illegible]Konstantin Tsiokovsky[illegible]1961[illegible]4[illegible]12[illegible]1969[illegible]6[illegible]21

[illegible]500[illegible]

[illegible]“[illegible]”——[illegible][15][illegible]1000[illegible]“[illegible]”[illegible]

[illegible][16][illegible]4[illegible]30 000[illegible]1/10[illegible]“[illegible]”[illegible]15.3[illegible]

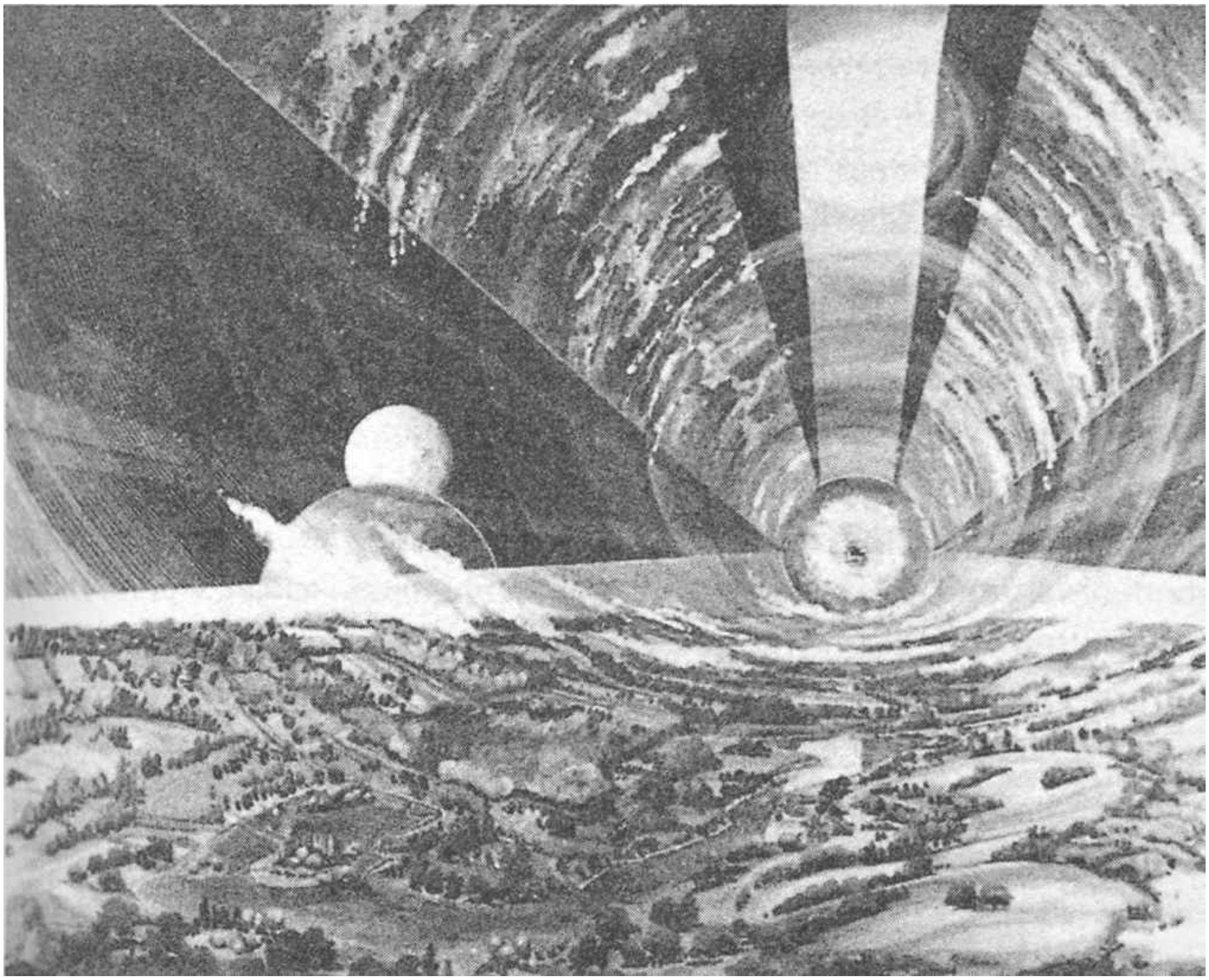


**图15.3** □□□□□□□□□□□□□□□□□□□□

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□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□·C.□□□□□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”[17]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[illegible] 20 [illegible][18] [illegible]

[illegible] —— [illegible] —— [illegible] 40 [illegible] 1950 [illegible] · [illegible] Los Alamos [illegible] “[illegible]” [illegible][19] [illegible]

[illegible] 1000 [illegible] 6500 [illegible]

## [illegible]

[illegible]

[illegible]40[illegible]30[illegible][20][illegible]

[illegible]6000[illegible]·[illegible]“[illegible]2000℃[illegible]3/4[illegible]”[21][illegible]——[illegible]——[illegible]

[illegible]——[illegible]90%[illegible][22]

[illegible]“[illegible]”[illegible]Big Crunches[illegible][23][illegible]

[illegible]20[illegible]90[illegible]——[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]1030[illegible]

[illegible]·[illegible]20[illegible]70[illegible]10[illegible]10[illegible]15.1[illegible]1030[illegible]“[illegible]”[24][illegible]·[illegible]“[illegible]——[illegible]”[25]

**[illegible]15.1** [illegible]

| 大爆炸以来的时间（年） | 重大事件 |
| --- | --- |
| $10^{14}$ | 大多数恒星都死亡了；主宰宇宙的是冷物质、黑矮星、中子星、死亡的行星和小行星，以及星际黑洞；随着宇宙的膨胀，幸存下来的物质都是相互分离的。 |
| $10^{20}$ | 许多物体都飘离星系；那些残留的物体塌陷到星系的黑洞里面。 |
| $10^{32}$ | 质子大多毁坏，留下一个由能量、轻子和黑洞组成的宇宙。 |
| $10^{66}$—$10^{106}$ | 星际和恒星黑洞蒸发。 |
| $10^{1500}$ | 经过量子“通道”，剩下的物质转变为铁。 |
| $10^{1076}$ | 剩下的物质转变为中子物质，然后变为黑洞，蒸发。 |

[illegible]·[illegible]2000[illegible]263[illegible]

[illegible][26]

[illegible]——[illegible]

# [illegible]

[illegible]

[illegible]40[illegible]130[illegible]

## [illegible]

[illegible]·[illegible]21[illegible]1996[illegible]·[illegible]1999[illegible]·[illegible]2001[illegible]·[illegible]Bjørn Lomborg[illegible]2001[illegible]·[illegible]21[illegible]1994[illegible]·[illegible]·[illegible]1985[illegible]“[illegible]”[illegible]·[illegible]Walter Miller[illegible]1959[illegible]·[illegible]2000[illegible]·[illegible]1995[illegible]

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[1] [illegible]·[illegible]——[illegible]Murray Gell-Mann[illegible]·[illegible]Yorick Blumenfeld[illegible]20[illegible]1999[illegible]79[illegible]471[illegible]·[illegible]1993[illegible]149[illegible]111-A-D[illegible]115[illegible]

[2] [illegible]·[illegible]·[illegible]20[illegible]

[3] [illegible]20[illegible]

[4] □□·N.□□□□□□□□□□□□21□□□□□□□□□□□□□□□□□□□□□□□1996□□□□□158□□

[5] R. C. □□□□□□□□□□□□□□□□□□□□□□□□□1956□□□54□□□□□□□□·□□□·□□□John Lewis Gaddis□□□□□□□□□□□□□□□□□□□□□□□□□□□□□2002□□□□□58□□

[6] □□□□□·□□□□□□□□□□□□□□□□□□□□□□□□7—23□□□□□□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1960□□□□·H.□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1972□□□□□□□□□□□□□□□□□□□□□□□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□21□□□□□□□□——□□□□□□□□□□□□□□□2003□□□

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[8] □□□□□□□□·R. □□□□□□□□□□□□□□□330□□

[9] □□□·R. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□W. W. □□□2001□□□□□□□□——□□□□□□□□□□□□□□□□□□□□□□□□61—79□□

[10] □□□·R. □□□□□□·□□□□Jannifer Michell□□□□□□□□□□□□□□□□□□□□1998□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1998□□□□174□□

[11] □□□□·□□□Gareth Poter□□□□□·□□□□·□□□□Janet Welsh Brown□□□□□·S. □□□□Pamela S. Chasek□□□□□□□□□□□□3□□□□□□□□□□□□□□□□2000□□□□87—93□□

[12] □□□·R. □□□□□1995□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1995□□□□172□□

[13] □□□□□□□□□□□□21□□□□74□□

[14] □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□——□□□

[15] □□□·□□□□□Nikos Prantzos□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□2000□□□□56□73□□□□□□□□□□□□□□□□75—80□□

[16] □□□□□□□□□□□□□□□□□□□□□□□□2□□

[17] □□·C. □□□□□□□□□□□□□□□□□□□□□□□□□□□19□□

[18] □□□·□□□□□□Brian Stableford□□□□·□□□□Dvid Langford□□□□□□□□□□□2000—3000□□□□□□□□□□□□□□□□□□1985□□□□□□□20□□80□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[19] □□□□□□□□□□□□□□□162—169□□□□□□□□□□□□□164□□□□□□□□□□□18□□□□□□□□□□□□□Fontenelle□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1998□□□□236—244□□

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[21] □□□□□□□□□□□□□□□214□□

[22] □□□□□□□□□□□□□□□225—229□□

[23] □□□□□□□□□□□□□□□□□□□□□□·□□□John Wheeler□□□□□□□□□·□□□□□□□Ken Croswell□□□□□□□□□□□□□□□□□□□□1996□□□216□□□□□·□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1988□□□□150—151□□

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## [illegible]

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[illegible]1A [illegible]

| 地质年代 | 纪 | 起始时间（距今） | 重大事件 |
| --- | --- | --- | --- |
| 冥古代 | | 46 亿年 | 太阳系形成；月亮；熔融的液态和“分化”；最古老的岩石，早期大气层 |
| 太古代 | | 40 亿年 | 最早的生命；原核生物 |
| 原生代 | | 25 亿年 | 氧气增加；真核生物 |
| | 埃迪卡拉纪 | 5.9 亿年 | 最早的多细胞有机体 |
| 古生代 | 寒武纪 | 5.7 亿年 | 最早的带有贝壳的有机体 |
| | 奥陶纪 | 5.1 亿年 | 最早的珊瑚、脊椎动物 |
| | 志留纪 | 4.39 亿年 | 最早的多骨鱼类、最早的树 |
| | 泥盆纪 | 4.09 亿年 | 最早的鲨鱼、两栖动物 |
| | 石炭纪 | 3.63 亿年 | 最早的爬行动物、有翼昆虫；煤形成 |
| | 二叠纪 | 2.9 亿年 | 生物大灭绝 |
| 中生代 | 三叠纪 | 2.5 亿年 | 最早的恐龙、蜥蜴、哺乳动物 |
| | 侏罗纪 | 2.08 亿年 | 最早的鸟类 |
| | 白垩纪 | 1.46 亿年 | 最早的开花植物、有袋类动物 |
| 新生代（第三纪） | 古新世 | 6500 万年 | 小行星影响；恐龙灭绝；哺乳动物和开花植物的传播；最早的灵长目 |
| | 始新世 | 5700 万年 | 最早的猿人 |
| | 渐新世 | 3600 万年 | 早期类人动物 |
| | 中新世 | 2300 万年 | 人科动物与猿类分离 |
| | 上新世 | 520 万年 | 南方古猿、能人 |
| （第四纪） | 更新世 | 160 万年 | 直立人、现代人 |
| | 全新世 | 1 万年 | 后冰川时代人类历史 |

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[1] [illegible]·[illegible]1998[illegible]285[illegible]·[illegible]2[illegible]1998[illegible]2[illegible]·[illegible]Nigel Calder[illegible]1983[illegible]

[2] [illegible]C14[illegible]C13[illegible]C12[illegible]6[illegible]C12[illegible]C13[illegible]98.9%[illegible]1.1%[illegible]C14[illegible]

[3] [illegible]C14[illegible]11—25[illegible]

[4] [illegible]Nyantiloka[illegible]3[illegible]1972[illegible]“[illegible]”[illegible]“[illegible]”[illegible]——[illegible]

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19 · Sadi Carnot 19 “ ” · Rudolf Clausius “ ” [2]

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[1] [illegible]·[illegible]1996[illegible]·J. [illegible]2001[illegible]·[illegible]Erwin Schrödinger[illegible]1992[illegible]1994[illegible]1[illegible]·[illegible]Ilya Progogine[illegible]·[illegible]Isabelle Stengers[illegible]1984[illegible]·[illegible]1989[illegible]·[illegible]·[illegible]2000[illegible]·[illegible]Stuart Kauffman[illegible]1995[illegible]·[illegible]1993[illegible]

[2] “[illegible]”[illegible]·[illegible]1998[illegible]299—300[illegible]·[illegible]2000[illegible]XI[illegible]241—242[illegible]

[3] [illegible]·[illegible]Roger Panrose[illegible]1900[illegible]·[illegible]Martin Reeds[illegible]

[illegible]2000[illegible]239—242[illegible]

[4] [illegible]119[illegible]

[5] [illegible]241[illegible]

[6] [illegible]·[illegible]Rod Swenson[illegible]·[illegible]·[illegible]1995[illegible]16[illegible]300[illegible]“[illegible]”

[7] [illegible]

[8] [illegible]·[illegible]·[illegible]·[illegible]·[illegible]·[illegible]1998[illegible]35[illegible]“[illegible]”[illegible]13[illegible]

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[illegible]E. O. [illegible]Wilson[illegible]“[illegible]”[illegible][3][illegible]25[illegible]

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[illegible]E. H. [illegible]Carr[illegible]1961[illegible]1961[illegible]

[illegible]·[illegible]·[illegible]George Macauley Trevelyan[illegible]20[illegible]70[illegible]

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2001[illegible]·[illegible]David Cannadine[illegible]40[illegible][18][illegible]H. G.[illegible]

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[illegible]·[illegible]Richard Evans[illegible]·[illegible]Hayden White[illegible]1973[illegible]19[illegible]——[illegible]·[illegible]

[illegible]……[illegible]2000[illegible]2001[illegible]“[illegible]”[illegible]12[illegible]·[illegible]Eric Chaisson[illegible]20[illegible]·[illegible]Fred

Spier□□□□·□□□□□□□Johan Goudsblom□□□□□□□□□□·□□□□John Mears□□□□□□□□□□·□□□□·□□□Cynthia Stokes Brown□□□□□□□□□·□□□□□Tom Griffiths□□□□□·□□□□Graeme Davidson□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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[illegible][27]H. G. [illegible]776[illegible][28]19[illegible]20[illegible]50[illegible]1953[illegible]·[illegible]Claire Paterson[illegible]45.6[illegible]1961[illegible]1962[illegible]·[illegible]John Mulvaney[illegible]5[illegible]6[illegible][29][illegible]·[illegible]Colin Renfrew[illegible]

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[illegible]20[illegible]·[illegible]·[illegible]“[illegible]……[illegible]”[illegible]

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[illegible]20[illegible]“[illegible]”[illegible]20[illegible]20[illegible]

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“”（rigimes）“”（Goldilocks conditions）·

“”（free energy density）

[34]

*Homo sapiens*

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]Noösphere[illegible][35]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]20[illegible]

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[illegible]……”[illegible]·[illegible]Marshall Berman[illegible]“[illegible]‘[illegible]’”[illegible][37]

[illegible]20[illegible]50[illegible]

[illegible]20[illegible]60[illegible]40[illegible]1961[illegible]

[illegible]500[illegible]·[illegible]20[illegible]“[illegible]”[38][illegible]20[illegible]

[illegible]40[illegible]6[illegible]

“1/3 1/2 ” [39]

1919 H. G.

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[1] [illegible]"What is Big History"[illegible]International Big History Association[illegible]*Journal of Big History*[illegible]2017[illegible]1[illegible]·[illegible]·[illegible]Lowell Gustafson[illegible]

[2] [illegible]·[illegible]Jean Bodin[illegible]16[illegible]·[illegible]Craig Benjamin[illegible]·[illegible]——[illegible]Marnie Hughes-Warrinton[illegible]2005[illegible]95[illegible]

[3] E. O. [illegible]1998[illegible]

[4] E. H. [illegible]1954[illegible]7[illegible]1961[illegible]1961[illegible]·[illegible]·[illegible]

[5] [illegible]5[illegible]

[6] [illegible]·[illegible]Fred Spier[illegible]2[illegible]——[illegible]2015[illegible]·[illegible]Andrea Wulf[illegible]·[illegible]·[illegible]·[illegible]2015[illegible]

[7] [illegible]1962[illegible]·[illegible]2[illegible]1970[illegible]

[8] [illegible]7—8[illegible]

[9] [illegible]1959[illegible]

[10] [illegible]32[illegible]

[11] [illegible]26[illegible]

[12] [illegible]84[illegible]

[13] [illegible]23[illegible]

[14] [illegible]24[illegible]

[15] [illegible]·[illegible]·[illegible]（Jan Van der Dussen）[illegible]1994[illegible]

[16] [illegible]·C. [illegible]2[illegible]1978[illegible]595[illegible]

[17] [illegible]30[illegible]

[18] [illegible]·[illegible]2002[illegible]

[19] [illegible]·[illegible]·[illegible]（Guldi and David Armitage）[illegible]2014[illegible]（short-termism）[illegible]

[20] [illegible]·[illegible]2001[illegible]·[illegible]2[illegible]2011[illegible]·[illegible]2[illegible]——[illegible]2015[illegible]·[illegible]·[illegible]2[illegible]2012[illegible]·[illegible]·[illegible]·[illegible]·[illegible]——[illegible]2014[illegible]Barry Rodrigue[illegible]·[illegible]·[illegible]1[illegible]2015[illegible]DK[illegible]2016[illegible]

[21] [illegible]149[illegible]

[22] [illegible]49[illegible]2010[illegible]12[illegible]5—26[illegible]

[23] [illegible]·[illegible]57[illegible]

[24] [illegible]57[illegible]

[25] [illegible]·[illegible]1980[illegible]·[illegible]1978[illegible]“[illegible]”[illegible]·[illegible]（Vladimir Vernadsky）[illegible]1998[illegible]

[26] [illegible]·[illegible]（John Ziman）[illegible]2000[illegible]

[27] [illegible]· [illegible]Historia, complejidad y revolución cronmétrica[illegible]Revista de Occidente[illegible]2008[illegible]4[illegible]323[illegible]27—57[illegible]·[illegible]·J. [illegible]（Steven J. Dick）[illegible]·L. [illegible]（Mark L. Lupisella）[illegible]NASA[illegible]2009[illegible]441—462[illegible]·[illegible]（Doug Macdougall）[illegible]2008[illegible]

[28] H. G. [illegible]3[illegible]1921[illegible]1102[illegible]

[29] [illegible]·[illegible]·[illegible]（Johan Kamminga）[illegible] & [illegible]1999[illegible]1—2[illegible]

[30] [illegible]·[illegible]2007[illegible]41[illegible]

[31] [illegible]153[illegible]

[32] [illegible]·[illegible]37[illegible]1[illegible]1998[illegible]12—13[illegible]

[33] [illegible]VI. 08[illegible]2016[illegible]7[illegible]

[34] [illegible]·M. [illegible]Peter M. Hoffmann[illegible]2012[illegible]“[illegible]”[illegible]ATP[illegible]

[35] [illegible]“[illegible]”[illegible]·[illegible]2017[illegible]Edge.org[illegible]2017[illegible]1[illegible]http://www.edge.org/response-detail/27068[illegible]

[36] [illegible]1993[illegible]——[illegible]

[37] [illegible]·[illegible]1988[illegible]1982[illegible]15[illegible]

[38] [illegible]·[illegible]57[illegible]3[illegible]2011[illegible]353—365[illegible]·R. [illegible]W. W. [illegible]2000[illegible]

[39] [illegible]·[illegible]Graham Allison[illegible]·[illegible]Philip Zelikow[illegible]2[illegible]1999[illegible]271[illegible]

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# 太阳底下的新鲜事

Something New Under the Sun

[美]约翰·R. 麦克尼尔(John R. McNeill)著 李芬芳 译

## 20世纪人与环境的全球互动

An Environmental History of the Twentieth-Century World

中信出版集团

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A.1 1500—1992GDP

| 年份 | 全球 GDP[a] |
| --- | --- |
| 1500 | 100 |
| 1820 | 290 |
| 1870 | 470 |
| 1900 | 823 |
| 1913 | 1136 |
| 1929 | 1540 |
| 1950 | 2238 |
| 1973 | 6693 |
| 1992 | 11664 |

Maddison 199519,227

aGDP1500

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A.2 1500GDP

| 年份 | 全球人均 GDP（以 1900 年美元计算） | 指数（1500 年为 100） |
|---|---|---|
| 1500 | 656 | 100 |
| 1820 | 651 | 117 |

续表

| 年份 | 全球人均 GDP（以 1900 年美元计算） | 指数（1500 年为 100） |
|---|---|---|
| 1900 | 1263 | 224 |
| 1950 | 2138 | 378 |
| 1992 | 5145 | 942 |

[illegible]Maddison 1995[illegible]228

[illegible]1500[illegible]9[illegible]1900[illegible]4[illegible]1500[illegible]500[illegible]20[illegible]“[illegible]”[illegible]creative destruction[illegible][5][illegible]30[illegible]

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□A.3 1820□□□□□□□□

| 年份 | 人口（单位：10 亿） | 年增长率（%） |
|---|---|---|
| 1820 | 1 | — |
| 1850 | 1.2 | 0.5（1820—1849） |
| 1900 | 1.6 | 0.6（1850—1899） |
| 1950 | 2.5 | 0.8（1900—1949） |
| 1990 | 5.3 | 1.8（1950—1989） |
| 2000 | 6.0 | 1.5（1990—1999） |

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[illegible]99%[illegible]1800[illegible]5%[illegible]20[illegible]200[illegible]1900[illegible]1800[illegible]30[illegible]19[illegible]1800[illegible]1000[illegible]1900[illegible]100[illegible][15]

[illegible]1900[illegible]·[illegible]James Young[illegible]19[illegible]50[illegible]·[illegible]Edwin Drake[illegible]1859[illegible]1880[illegible]

□□□1900□□□□□□□□□□□□□□□□19□□90□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□A.4□□A.5□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□[16]□□□□□□□□□□□□□□□□1890□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□“□□□□□□□□□□□□□□□□□”□□□□□□□□□□□□□□□□□□□□

□A.4 □□□□□□1800—1990□□

| 燃料种类 | 产量（百万吨） | | |
|---|---|---|---|
| | 1800 | 1900 | 1990 |
| 生质燃料 | 1000 | 1400 | 1800 |
| 煤炭 | 10 | 1000 | 5000 |
| 石油 | 0 | 20 | 3000 |

□□□□□□Smil 1994□187

□□□□□□□□□□□□□□□□□□1□□□□□□1□□□5□□□□□□□□□2□□

□A.5 □□□□□□1800—1990□□

| | 1800 | 1900 | 1990 |
|---|---|---|---|
| 总量（单位：百万吨油当量） | 250 | 800 | 10000 |
| 指数（1900 年为 100） | 31 | 100 | 1250 |

□□□□□□Smil 1994□187

[illegible]19[illegible]5[illegible]20[illegible]1950[illegible][17][illegible]16[illegible]1000[illegible]20[illegible]1900[illegible]20[illegible]1900[illegible]1000[illegible]10[illegible]1900[illegible]100[illegible]20[illegible]

[illegible]20[illegible]4[illegible]5[illegible]20[illegible]90[illegible]“20[illegible]”[illegible]20[illegible]365[illegible]24[illegible][18]

[illegible]2[illegible]3[illegible]1950[illegible]20[illegible]90[illegible]50[illegible]100[illegible]75[illegible]20[illegible]60[illegible]

[illegible]19[illegible]60[illegible]20[illegible]

# [illegible]

[illegible]19[illegible]20[illegible]14[illegible]4[illegible]4[illegible]19[illegible]5[illegible]20[illegible]16[illegible]

[illegible]18[illegible]1550[illegible]1850[illegible]

[illegible]18[illegible]60[illegible]

[illegible]1950[illegible]

[illegible]20[illegible]1900[illegible]20[illegible]

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[1]Frank,1947.

[2][illegible]1990[illegible]-[illegible]Geary-Khamis dollar[illegible]Maddison 1995[illegible]19[illegible]

[3][illegible]1820[illegible]

[4][illegible]1500[illegible]GDP[illegible]120[illegible]GDP[illegible]9[illegible]13[illegible]1500[illegible]

[5][illegible]·[illegible]Joseph Schumpeter[illegible]20[illegible]

[6]Cohen 1955□77.

[7]18□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Livi-Bacci 1992□

[8]□□□□□□□Cipolla 1978□89□

[9]Biraben 1979□16□Bourgeois-Pichat 1988□□□□□Livi-Bacci 1992□32–3□Westing 1981□□□□500□□□□□Keyfitz 1996□□690□□Haub 1995□□□1050□□□□□□□□□□□□□□□□□Westing□□30□□□□□Keyfitz□100□□

[10]□□□□□□□□□□□□□□□□□□□□□□□□gravitational energy□□□□□□□□□□□□□□□□□

[11]□□□□Cipolla 1978□35–69□Debeir et al.1986□Smil 1994□

[12]Smil 1994□226□Cipolla 1978□53□□□□□□□□□□□80%□85%□□□□□□□□□□□

[13]□□□□□□□□□□□□1□□□□□□□□□□1□□

[14]Sϕrensen 1995□392–404□□□□□□□□

[15]Smil 1994□186□Cipolla 1978□56□1800□1500□□1900□□7.01□□

[16]1994□□□□□□□40%□□27%□□23%□□□7%□□3%□□□□□□□□□□□□□□□□□□□1%□WRI 1996□276–7□□□□□□□□□□□□□□□□□□20□□90□□□□□□□□□□□□□□□□25□□

[17]□□□□□1800□□□□□□□□□□□80□□Starr 1996□244□□□□□□□□1850□□□□50□□Levi-Bacci 1992□28□□□□Smil□□□

[18]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

# [illegible]

[illegible]6[illegible]

[illegible]20[illegible]1900[illegible]——[illegible]

[illegible][1]

[1]Turner nt al 1990，393–466[illegible]

# [illegible]1[illegible] [illegible]

[illegible]

——[illegible]Virgil[illegible]*Georgics*[illegible]

[illegible]20[illegible]geological agent[illegible]

[illegible][1][illegible]20[illegible]

## [illegible]

[illegible]120[illegible]——[illegible]

[illegible][2]

## [illegible]

[illegible]20[illegible]19[illegible]“[illegible]”（superphosphate）[illegible]

[illegible]1842[illegible]·[illegible]（John Lawes，1814—1900）[illegible]1888[illegible]1921[illegible]（Kolal Peninsula）1930[illegible]1937[illegible][3][illegible]20[illegible]

[illegible]20[illegible][4][illegible]19[illegible]1909[illegible]（Fritz Haber）[illegible]·[illegible]（Karl Bosch）[illegible]—[illegible]

[illegible]1868[illegible]（Silesia）[illegible]（Breslau）[illegible]

1892[illegible]30[illegible]Karlsruhe[illegible]

[illegible]1900[illegible]1/3[illegible]nitrogen fixation[illegible]—[illegible]1918[illegible]—[illegible][5]

[illegible]1916[illegible]1919—1926[illegible]1933[illegible]20[illegible][6][illegible]·[illegible]Jonathan Swift[illegible]1726[illegible]“[illegible]”[illegible]200[illegible][7]

[illegible]—[illegible]1929—1938[illegible]1940[illegible]400[illegible]1965[illegible]4000[illegible]1990[illegible]1.5[illegible][8][illegible]

[illegible]20[illegible]30%[illegible][9][illegible]1950—1985[illegible]20[illegible]60[illegible]1970[illegible]

[illegible]

[illegible]eutrophication[illegible]5[illegible]“[illegible]”[illegible][10]

[illegible]1950[illegible]——[illegible]2/3[illegible]

# [illegible]

20[illegible]

[illegible]20[illegible]20[illegible]1875—1975[illegible]20[illegible][11][illegible]

[illegible]1868[illegible]19[illegible]20[illegible]

[illegible]1926[illegible]“[illegible]”[illegible]“[illegible]”[illegible]1950[illegible]1973[illegible]1980[illegible]10%[illegible]20[illegible][12]

[illegible]20[illegible]70[illegible]Sadbury[illegible]400[illegible]1970[illegible]20[illegible]80[illegible]Hesse[illegible][13]20[illegible]10[illegible]100[illegible]20[illegible]70[illegible]3000[illegible]20[illegible][14]

[illegible]19[illegible]20[illegible]1900[illegible]1000[illegible]15[illegible][15][illegible]1940[illegible]1982[illegible]350[illegible]1940[illegible]1950[illegible]50%[illegible]70%[illegible]

[illegible]1980[illegible]1936[illegible]80%[illegible]85%[illegible][16][illegible]1976—1980[illegible]Love Canal[illegible]1942—1953[illegible]Hooker Chemical Company[illegible]

[illegible]1980[illegible]1980[illegible]5[illegible]Superfund[illegible]

[illegible]20[illegible]70[illegible]1989[illegible]1989—1990[illegible]20[illegible]80[illegible]1987[illegible]20[illegible]80[illegible]90[illegible][17]

[illegible]1941[illegible][18]

1950[illegible]1975[illegible]

## [illegible]

[illegible]20[illegible]1.1[illegible]20[illegible]90[illegible]20[illegible]20[illegible]

□90□□□□□□□1/10□□□□□□□□□[19]□□□□□□□□□□□1990□□□□□□□□□
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□1.1 □□□□□□□□□□□□□□□

| | 单位：10 亿吨 |
|---|---|
| 风蚀 | 1.0 |
| 冰河 | 4.3 |
| 造山运动 | 14 |
| 海底火山[a] | 30 |
| 人为[b] | 42 |
| 水[c] | 53 |

□□□□Hooke 1994

□a□□□□□□□□□□□□□□□

□b□Hooke□□□400□□450□□□□□□□□□

□c□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□140□□□□□□□□□□□□□
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□□□□□□□1—3□□□□□□□□□10—12□□□□□□□□□□□□1870□□□□□□□□□
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□□19□□□□□10□□□20□□□□□6□7□□□□□□□□□□□□□□□□□□□□□□□□□□□
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1980□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1890□□□□□□□□□
1930□□□□□□□□□20□□90□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[illegible]1980[illegible][21][illegible]20[illegible]40[illegible]4[illegible]5[illegible][22]

[illegible]1.2 1850—1995[illegible]

| 年份 | 产出（单位：百万吨） | 指数（1900 年为 100） |
| --- | --- | --- |
| 1800 | 10 | 1.3 |
| 1850 | 76 | 10 |
| 1875 | 283 | 37 |
| 1900 | 762 | 100 |
| 1925 | 1358 | 178 |
| 1950 | 1800 | 236 |
| 1975 | 3257 | 427 |
| 1995 | 5000 | 656 |

[illegible]Headrick 1990[illegible]60[illegible]Erickson 1995[illegible]78[illegible]Smil 1994[illegible]186[illegible]

[illegible][23][illegible]1966[illegible]Sacramento River[illegible]1800—1909[illegible]10[illegible]Perak River[illegible]Clutha River[illegible][24][illegible]New Caledonia[illegible]

[illegible]1840[illegible]

[illegible]1853[illegible]20[illegible]1/4[illegible]1/3[illegible]

[illegible]1926[illegible]1994[illegible]1890—1990[illegible]Société le Nickel,SLN[illegible]5[illegible]1[illegible]250[illegible]

[illegible]Kanak[illegible]20[illegible]30[illegible]



[illegible]1944[illegible]Chuquicamata[illegible]20[illegible]
[illegible]
[illegible]1980[illegible]

1950[illegible]40[illegible]1960[illegible]10[illegible]1976[illegible]100[illegible]20[illegible]80[illegible]10[illegible][25]

[illegible]1880[illegible]1960[illegible]Bougainville[illegible]Panguna[illegible]1980[illegible]Ok

Tedi[illegible]1980[illegible]Irian Jaya[illegible]Freeport[illegible][26][illegible]
[illegible][27]

[illegible]60%[illegible]80%[illegible][28]

[illegible]Miletus[illegible][29]

[illegible][30][illegible]2000[illegible]1000[illegible]

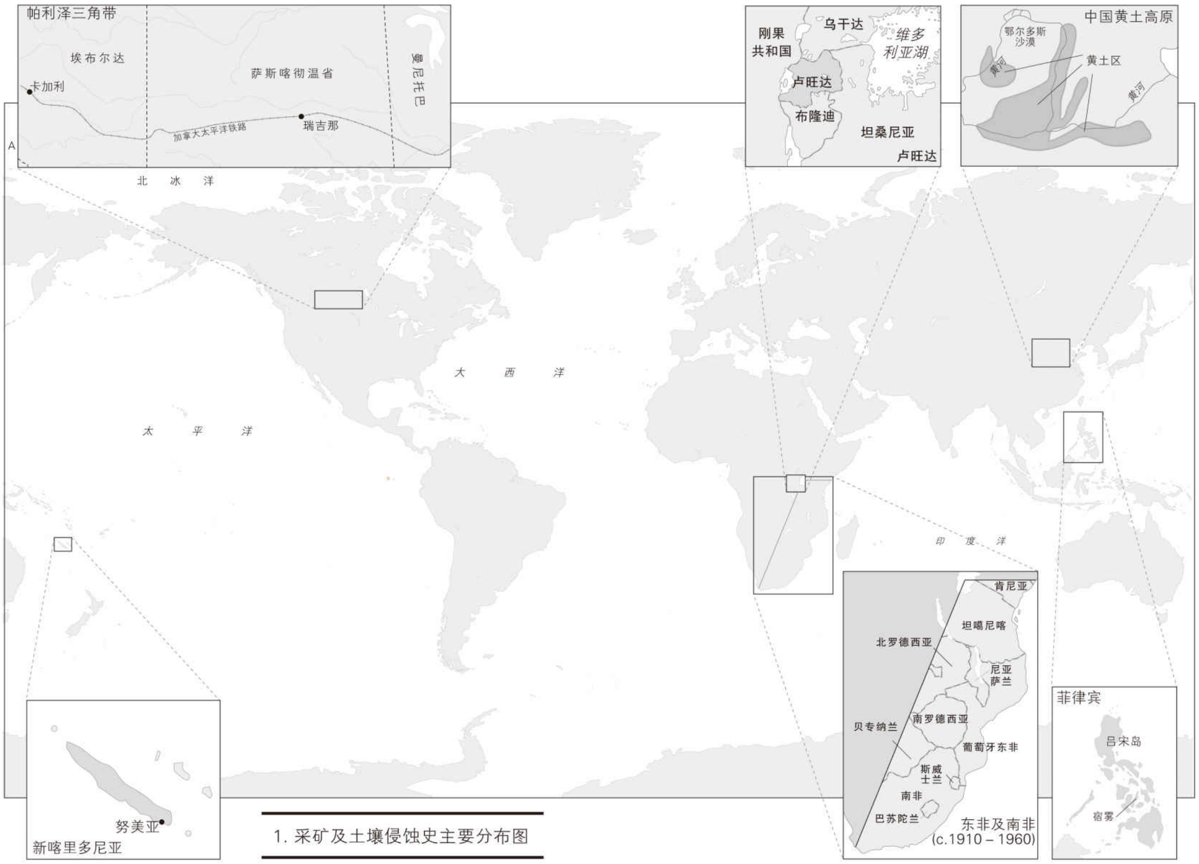
[illegible]
4000[illegible]300[illegible]3000[illegible][31][illegible]11[illegible]2000[illegible]20[illegible]17[illegible]1990[illegible]22[illegible][32]

[illegible]1492[illegible]

[illegible] 1650—1700 [illegible][33] [illegible] 1840 [illegible] 6000 [illegible] Maghreb [illegible][34] [illegible][35] [illegible]

[illegible]

[illegible] Rhodesia [illegible] 1890 [illegible] “[illegible]” [illegible] 1918 [illegible] 20 [illegible] 30 [illegible] · [illegible] Jan Smuts [illegible] “[illegible]”[36] [illegible] 25 [illegible]




1. 采矿及土壤侵蚀史主要分布图

[illegible]1920[illegible]

[illegible]cultural attachment[illegible]1890—1960[illegible][37][illegible]

[illegible]

[illegible]1870[illegible][38]

[illegible]Palliser Triangle[illegible]Alberta[illegible]Saskatchewan[illegible]Manitoba[illegible]1857[illegible]·[illegible]John Palliser[illegible]1885[illegible]1897[illegible]1901—1915[illegible]15[illegible]Rudyard Kipling[illegible]1907[illegible]“[illegible]”[illegible]Nineveh[illegible][39][illegible]1915[illegible]1916[illegible]

[illegible]20[illegible]20[illegible]20[illegible]30[illegible]300[illegible]400[illegible]“[illegible]”[illegible]1934[illegible]“[illegible]”[illegible]Canadian Commonwealth Federation[illegible]Canadian Commonwealth[illegible][40]

20[illegible]20[illegible]30[illegible]

[illegible]19[illegible]G.V.Jacks[illegible]R.O.Whyte[illegible]“1914—1934[illegible]”[illegible][41]

[illegible]1930[illegible]20[illegible]50[illegible]60[illegible]

[illegible]20[illegible]“[illegible]”[illegible][42][illegible]20[illegible]30[illegible]1934[illegible]

[illegible]20[illegible]50[illegible]20[illegible]90[illegible]1925—1935[illegible][43][illegible][44]

[illegible]20[illegible]50[illegible]1950[illegible]

1945[illegible][45][illegible]

[illegible]

[illegible]1800[illegible]1898[illegible]

[illegible]1898[illegible]1860—1900[illegible]1920[illegible]1950[illegible]“[illegible]”[illegible]contour plowing[illegible]20[illegible]70[illegible]

[illegible]1946[illegible]1960[illegible]1989[illegible][46]

[illegible]4000[illegible]1800[illegible]20[illegible]1.3[illegible]

[illegible]1.3 1910—1996[illegible]

| 年份 | 密度（人／平方千米） |
| --- | --- |
| 1910 | 50—60 |
| 1932 | 51 |
| 1948 | 80 |
| 1978 | 180 |
| 1992 | 270 |
| 1996 | 260[a] |

□□□□□Bart 1993□Derenne 1988□□□□□□1996

□a□□□□□□□□□□□□□□□□□□□□□□□□□□□□□10%□

□□□□□□□□□1919□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Hutu□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□20□□□30□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1915□□□□□□□□□□□□□□“□□□□□□”□[47]20□□50□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

1961□□□□□□□□□□□□□□□□□□□□3%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□80□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1994—1996□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□[48]

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[illegible]1930—1990[illegible]3[illegible]6[illegible]20[illegible]70[illegible]Akamba[illegible][49]

[illegible]1960[illegible]8000[illegible]1930[illegible][50][illegible]

[illegible]1930[illegible]soil compaction[illegible]1950[illegible]20[illegible]20[illegible]90[illegible][51]1960[illegible]5[illegible]1990[illegible]7%[illegible]100[illegible]1945—1990[illegible]1950[illegible]“[illegible]”[illegible]salt creep[illegible][52][illegible]20[illegible]1945—1975[illegible][53][illegible]runoff[illegible]

## [illegible]

[illegible]1/3[illegible]20[illegible]1/4[illegible]4.3[illegible]7[illegible]“[illegible]”[illegible][54][illegible]1978[illegible]31%[illegible][55][illegible]9[illegible]1960[illegible]20[illegible]1000[illegible]17[illegible]1982[illegible]40%[illegible][56][illegible]1994[illegible]150[illegible][57][illegible]UNFAO[illegible]1991[illegible]0.3%[illegible]0.5%[illegible]20[illegible][58][illegible][59]

[illegible]20[illegible]1950[illegible]1970[illegible]25[illegible][60][illegible]

[illegible]20[illegible]90[illegible]20[illegible]1900[illegible]97%[illegible][61][illegible]

[1]□□□□□Pimentel et al.1995□1118–9□

[2]Hillel 1991 □ 23–30□Rozanov et al.1990 □ 203–5□Stanners and Bourdeau 1995□147–8□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□geosphere□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[3]Smil 1990□431□1994□□□□□□□□□□□□□□□□□□□□□□□□□□□1995□10–11□□

[4]□□□□□□□□□□□□□□□□□□□□□□□

[5]□□□□□□□20□□20□□□□□□□□□□□□□□□□□□□□Friedrich 1993□□

[6]Smil 1994□182□189–90□□Smil 1993□165□□□□Goran 1967□□□□□□□□□1925□□□□IG Farben□□□□□1931□□□□□□□□□

[7]Hillel 1991□129□132□

[8]□□□Brown et al.1996□9□Solbrig□Solbrig 1994□215□

[9]□□Smil 1993□165□□□□□□□□□□□□□1/3□1/4□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[10]Wes Jackson□□□□□□Opie 1993□257□Olson 1987□220–21□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[11]German Advisory Council on Global Change 1995□86□

[12]Asami 1983□1988□

[13]German Advisory Council on Global Change 1995□84□

[14]Asami 1983□Kitagishi □ Yamane 1981□Logan 1990□Nriagu 1990a □ 1996 □ 1980□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□3:1□□□7:1□□□25:1□□□□11:1□Brown et al.1990□439□□□□□□□□□□□□□□□□Mielke et al.1983□

[15]Tolba and El-Kholy 1992□249□□□□10□□□□□□□Prager 1993□□□8□□□

[16]Colten 1994□

[17]J.Clapp 1994□□20□□80□□□□□□3000□□□4500□□□□□20%□□□□□□□□Prager 1993□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[18]□□□□□□□1□□□□□□□□330□□□□□□□□□□□□□□□1700□□3700□□□□□□75□□□□□□USDOE 1995□□□□□□□□□□□□□□□□□□□□German Advisory Council on Global Change 1995□175□

[19]□□□□□□□□□1900□□□□2000□□1/4□□□□□1/14□□□□□□□□□□□□□□□□□

[20]Sherlock 1931□238□

[21]Nir 1983□70□

[22]Hooke□□□Monastersky 1994□Ryabchikov 1975□142□□□□□□□□3000□□□□□□□□□□1000□□□□□□□□□□□□□□

[23]1950—1990□□□□□□□□“□□”□□□□□□□□□□□Arnold et al.1990□77□□

[24]Meade et al.1990□266□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1909□□□□□□□□□□□□□□□□□□□□□□□□□□□□□8□□

[25]Dupon 1986□Winslow 1993□□1994□□□□□□□□□□□□□□□□□GNP□1/4□US Department of the Interior 1995□587□□

[26]Hyndman 1994[illegible]Fly River[illegible]tailing[illegible]Jaba River[illegible]20[illegible]80[illegible]1975[illegible]

[27][illegible]Bingham Canyon[illegible]Goudie 1985[illegible]Ripley et al.1996[illegible]Young 1996[illegible]105–30[illegible]

[28][illegible]Alexander 1993[illegible]230[illegible]Judson 1968[illegible]373[illegible]Lal and Pierce 1991a[illegible]2[illegible]·[illegible]Tim Beach[illegible]60%[illegible]80%[illegible]

[29]Meade et al.1990[illegible]

[30][illegible]Dregne 1982[illegible]Butzer 1975[illegible]

[31][illegible]Fang and Xie 1994[illegible]Ren and Walker 1998[illegible]Menzies 1996[illegible]556–8[illegible]

[32]Wen 1993[illegible]73–5[illegible]Ren and Zhu 1994[illegible]1855[illegible]50[illegible]1970[illegible]Milliman et al.1987[illegible]Lal 1990[illegible]145[illegible]50%[illegible]

[33]Smith and Baillie 1985[illegible]Heine 1983[illegible]

[34][illegible]1910[illegible]1/8[illegible]1/6[illegible]1/10[illegible]1870—1920[illegible]10%[illegible]15%[illegible]60%[illegible]65%[illegible]Conzen 1990[illegible]

[35]Butzer 1975[illegible]70[illegible]

[36]Jacks and Whyte 1939[illegible]21[illegible]·[illegible]Elspeth Huxley[illegible]Economist,18 January 1997[illegible]86[illegible]

[37]Anderson 1984[illegible]Beinart 1984[illegible]Khan 1997,SADCC 1987[illegible]Showers 1989[illegible]Stocking 1985[illegible]Whitlow 1988[illegible]Pletcher 1991[illegible]Jacks and Whyte 1939[illegible]247[illegible]“[illegible]”[illegible]Campbell 1991[illegible]

[38][illegible]

[39][illegible]Jones 1987[illegible]30[illegible]

[40]Anderson 1975[illegible]Jones 1987[illegible]Stark 1987[illegible]Worster 1979[illegible]20[illegible]50[illegible]60[illegible]19[illegible]90[illegible]

[41]Jacks and Whyte 1939[illegible]213[illegible]Bahre 1979[illegible]76–7[illegible]Barker and McGregor 1988[illegible]Barrett 1997[illegible]ch.3[illegible]Beach 1994[illegible]Molina Buck 1993[illegible]Wilson and Ryan 1988[illegible]

[42][illegible]Dregne 1982[illegible]12[illegible]

[43]Argabright et al.1996[illegible]

[44][illegible]Dregne 1982[illegible]Grove 1990[illegible]Helms 1992[illegible]Reij et al.1996[illegible]Wen 1993[illegible]Lal 1990[illegible]132[illegible]Opie 1993[illegible]9[illegible]Pimentel 1993[illegible]4[illegible]

[45]Foweraker 1981[illegible]McNeill 1988[illegible]

[46]De Bevoise 1995[illegible]Kummer 1991[illegible]41,1994[illegible]Lewis 1992[illegible]174–6,182–4[illegible]10[illegible]

[47]Bart 1993[illegible]23[illegible]

[48]Ibid.339–45[illegible]Derenne 1988[illegible]Tutsi[illegible]“[illegible]”[illegible]revenge fertility[illegible]1959[illegible]

[49]Moore 1979[illegible]Ondiege 1996[illegible]Tiffen et al.1994[illegible]1974[illegible]

[50][illegible]Blaikie 1985[illegible]177–9[illegible]Lal 1990[illegible]133–41[illegible]Roberts 1989[illegible]168–69[illegible]Grepperud 1996[illegible]Ives and Messerli 1989[illegible]McCreery 1989[illegible]Zimmerer 1993[illegible]Randrianarijaona 1983[illegible]

[51]Cruse and Gupta 1991[illegible]Raghavan et al.1990[illegible]

[52]Craswell 1993[illegible]268–9[illegible]Daniels 1987b[illegible]Hillel 1991[illegible]135–40[illegible]Young 1996[illegible]58–63[illegible]1960[illegible]36%[illegible]10%[illegible]25%[illegible]

[53]Pimentel et al.1993[illegible]280[illegible]

[54]Lal 1990[illegible]130[illegible]

[55]Ibid.145–6[illegible]

[56]NRC 1993a[illegible]221–2[illegible]Pimentel and Heichel 1991[illegible]115[illegible]

[57]Pimentel et al.1995[illegible]

[58]Solbrig and Solbrig 1994[illegible]231[illegible]

[59]Judson 1968[illegible]371[illegible]Lal and Pierce 1991a[illegible]2[illegible]2.6[illegible]

[60]Judson 1968[illegible]373[illegible]

[61]1900[illegible]Shaler 1905[illegible]139[illegible]

# [illegible]2[illegible] [illegible]

“[illegible]”

[illegible]——[illegible]20[illegible]

[illegible]20[illegible]20[illegible]1900[illegible][1][illegible]20[illegible]

## [illegible]

[illegible][2][illegible]100[illegible]5000[illegible]0.0003%[illegible]78%[illegible]21%[illegible]

[illegible]

[illegible]10[illegible][3]

[illegible]5000[illegible]

1.[illegible]360ppm[illegible]ppm[illegible]“[illegible]”[illegible]33[illegible]

2.[illegible]1[illegible]15/10[illegible]ppb[illegible]1/10[illegible]500[illegible]1000ppb[illegible]

3.[illegible]50ppb[illegible]

[illegible]CFC[illegible]2.1[illegible]

[illegible]2.1 20[illegible]

| 气体 | 人为来源 | 对人类的重要性 | 人为排放（%）[a] | 1900 年浓度（ppb） | 1990 年浓度（ppb） |
|---|---|---|---|---|---|
| 具有全球重要性[b] | | | | | |
| 二氧化碳 | 燃烧化石燃料；砍伐森林 | 温室气体 | ≈ 100 | 290000 | 350000 |
| 甲烷 | 稻田、牲畜、垃圾、化石燃料、采矿 | 温室气体 | ≈ 60 | 900 | 1700 |
| 氯氟碳化合物 | 冷冻剂、喷雾剂 | 破坏臭氧层、温室气体 | 100 | 0 | ≈ 3 |
| 氧化亚氮 | 肥料、燃烧生质燃料、砍伐森林 | 温室气体、破坏臭氧层 | ≈ 25 | 285 | 310 |
| 具有地方性或区域性重要性 | | | | | |
| 二氧化硫 | 燃烧化石燃料、矿砂冶炼 | 酸雨 | ≈ 65 | ? | 0.3-50 |
| 氧化氮 | 燃烧化石燃料或生物量燃料 | 酸雨、烟雾 | ≈ 65 | ? | 0.001 ~ 50 |
| 臭氧（对流层） | 汽车废气与阳光相互作用 | 温室气体、烟雾 | 50 ~ 70 | 10[c] | 20 ~ 40[c] |

□□□□Graedel and Crutzen 1989□Salstein 1995

□a□□□□□□□□□□□□1900□□□□□□□□□□□□□□□□□□□□□

[illegible]b[illegible]“[illegible]”[illegible]

[illegible]c[illegible]

[illegible]20[illegible]2.2[illegible]1920[illegible]20[illegible]30[illegible]1980[illegible][4]

[illegible]2.2 1850—1990[illegible]

| 年平均量（单位：吨） | | | | | |
|---|---|---|---|---|---|
| 年份 | 镉 | 铜 | 铅 | 镍 | 锌 |
| 1850—1900 | 380 | 1800 | 22000 | 240 | 17000 |
| 1901—1910 | 900 | 5300 | 47000 | 800 | 39000 |
| 1911—1920 | 1100 | 8000 | 49000 | 2100 | 49000 |
| 1921—1930 | 1400 | 9600 | 110000 | 2100 | 62000 |
| 1931—1940 | 1700 | 12000 | 170000 | 4900 | 75000 |
| 1941—1950 | 2200 | 17000 | 170000 | 8000 | 96000 |
| 1951—1960 | 3400 | 23000 | 270000 | 14000 | 150000 |
| 1961—1970 | 5400 | 44000 | 370000 | 26000 | 240000 |
| 1971—1980 | 7400 | 59000 | 430000 | 42000 | 330000 |
| 1981—1990 | 5900 | 47000 | 340000 | 33000 | 260000 |

[illegible]Nriagu 1994

## 1900[illegible]

[illegible]50[illegible]

[illegible][5][illegible]

[illegible]Hermopolis[illegible]Nubia[illegible][6][illegible]Horace[illegible][7][illegible]

[illegible][8][illegible]ice core[illegible]10[illegible]960—1279[illegible]15%[illegible]1[illegible]20[illegible]90[illegible]1/10[illegible]2500[illegible]1875[illegible][9][illegible]

[illegible]1000[illegible]Maimonides[illegible]1135—1204[illegible]Córdoba[illegible]“[illegible]”[illegible]“[illegible]”[illegible][10]

[illegible][11][illegible][12][illegible]

[illegible]13[illegible]16[illegible]17[illegible]——[illegible][13]

[illegible]

[illegible]

[illegible][14]

[illegible]·[illegible]Robert Southey[illegible]1808[illegible]“[illegible]”[illegible][15]

1780[illegible]1870[illegible]10[illegible][16][illegible]“[illegible]”[illegible]Black Country[illegible]Swansea[illegible]1/4[illegible]

[illegible]
[illegible]20[illegible]90[illegible]4[illegible]7[illegible][17]

## 1900[illegible]

20[illegible]
1900[illegible]
[illegible]20[illegible]60[illegible]
1990[illegible]“[illegible]”[illegible][18][illegible]
[illegible]

[illegible]19[illegible]
[illegible]1800—1920[illegible]
[illegible]20[illegible]10[illegible]20[illegible]
[illegible][19]

[illegible][20][illegible]
[illegible]W.P.Rend[illegible]1892[illegible]“[illegible]
[illegible]”[21]
[illegible]

[illegible]

[illegible]

[illegible][22]

[illegible]1920[illegible]1929[illegible]1946—1948[illegible]1948[illegible]1970[illegible]1950[illegible]20[illegible]60[illegible]70[illegible]1978[illegible]1980[illegible][23]

[illegible]1850[illegible]1890[illegible][24][illegible]

20[illegible]1921[illegible][25][illegible]20[illegible]20[illegible]1950[illegible]1950—1975[illegible]1960[illegible]1997[illegible]200[illegible]1910[illegible]100[illegible]1930[illegible]5000[illegible]1955[illegible]1[illegible]1985[illegible]5[illegible]1995[illegible]7.77[illegible][26][illegible]1950—1990[illegible]4[illegible]1.9[illegible]20[illegible]70[illegible][27][illegible]5%[illegible][28]

20[illegible]1945—1980[illegible]

[illegible]1920[illegible]1910[illegible]1950[illegible]

[illegible]1945—1973[illegible]

[illegible]

[illegible]20[illegible]40[illegible]1940[illegible]1966[illegible]1970[illegible]1980[illegible]1990[illegible]

[illegible]Ruhr[illegible]1960[illegible]“[illegible]”[illegible]greenfield[illegible][29][illegible]

[illegible]1921[illegible]·[illegible]Thomas Midgley[illegible]3[illegible]“[illegible]”[illegible]Dayton[illegible]25[illegible]6[illegible]1/3[illegible]1920[illegible]DuPont[illegible]tetraethyl lead[illegible]20[illegible]70[illegible]1967[illegible][30]1970[illegible]1975[illegible]1972[illegible]1987[illegible][31][illegible]20[illegible]70[illegible]20[illegible]80[illegible]20[illegible]90[illegible]

1977—1994[illegible]95%[illegible]20[illegible]80[illegible]20[illegible]90[illegible][32][illegible]

1945[illegible]1975[illegible]1920—1970[illegible]1970[illegible]20[illegible]1950[illegible]1990[illegible]70%[illegible]95%[illegible]20[illegible]1/8[illegible][33]

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[illegible]2.3 20[illegible]1900—1990[illegible]

| 污染物 | 影响地区 | 增加率 | 数据源 |
|---|---|---|---|
| 铜 | 全球 | 5 | 1 |
| 铅 | 全球 | 7 | 1 |
| 锌 | 全球 | 5 | 1 |
| 氧化氮 | 美国 | 9 | 2 |
| 氧化氮 | 全球 | 14 | 3 |
| 挥发性有机化合物 | 美国 | 2.7 | 2 |
| 二氧化硫 | 美国 | 2.2 | 2 |
| 二氧化硫 | 欧洲 | 2 | 4 |
| 二氧化硫 | 承德（中国北部） | 10 | 5 |
| 二氧化硫 | 全球 | 5 | 6 |
| 臭氧 [a] | 欧洲 | 5 | 4 |
| 甲烷 | 全球 | 3.5 | 7 |

□□□□□1□Nriagu 1996□□2□USEPA 1995□□3□Smil 1990□□4□Graedel and Crutzen 1990□□5□Jiang 1996□□6□Husar and Husar 1990□RIVM 1997□UNEP 1997□225□□□□7□Stern and Kaufman 1996

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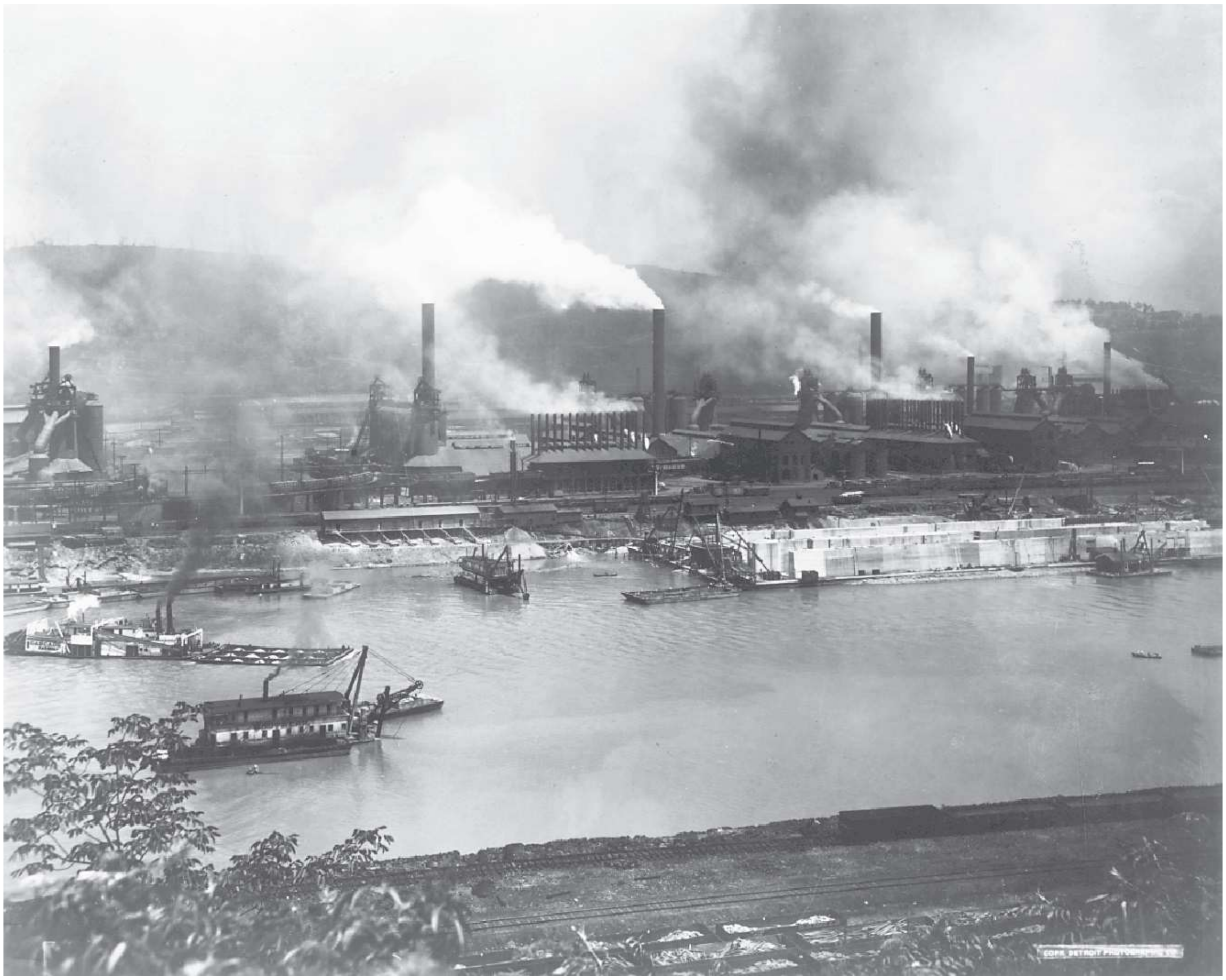
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[illegible]thermal inversion[illegible][45][illegible]1900[illegible]10[illegible]1930[illegible]140[illegible]1960[illegible]600[illegible][46][illegible]1920[illegible]20[illegible]40[illegible]1950—1990[illegible]4[illegible]1100[illegible]

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[illegible]2.4 [illegible]1900—1997[illegible]

| 年份 | 人口（单位：万） |
| --- | --- |
| 1900 | 35 |
| 1920 | 47 |
| 1940 | 180 |
| 1960 | 520 |
| 1980 | 1400 |
| 1997 | ≈ 2000 |

□□□□Ezcurra 1990b□Mitchell 1993a

□□□□□□□□□□□1930□□□□□□□□□□□7%□□1980□□□□30%□□□□□□□□□□□□□□□□□□□□□1910—1920□□□□□□□□□□□□□□□□□□1990□□□□□□3□□□□□□□4000□□□□□□□□□□□□□□□□□□□[58]

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[illegible][63][illegible]

[illegible][64][illegible]19[illegible]20[illegible]1997[illegible]1500[illegible]1903[illegible]

[illegible]1900[illegible]100[illegible]1950[illegible]500[illegible]1980[illegible]1947—1948[illegible]1970—1971[illegible]1880[illegible]20[illegible]40[illegible]

[illegible]18[illegible]1855[illegible]20[illegible]20[illegible]2500[illegible]

[illegible]1863[illegible]Lord Curzon[illegible]1859—1925[illegible]1903[illegible]“[illegible]”[illegible][65][illegible]1906[illegible]1912[illegible]90%[illegible]20[illegible]20[illegible]

“[illegible]”[66][illegible]1911[illegible]

[illegible]20[illegible]20[illegible]1950[illegible]20[illegible]70[illegible]25%[illegible]20[illegible]70[illegible]3[illegible]10[illegible]1975[illegible]20[illegible]80[illegible]2/3[illegible]1990[illegible]200[illegible]

[illegible]1980[illegible]1980[illegible]6[illegible]1992[illegible]50[illegible]1991[illegible]

[illegible]1970[illegible]20[illegible]90[illegible][67]

## [illegible]

[illegible]

[illegible] 20[illegible]20[illegible]3[illegible]1920[illegible]1980[illegible]20[illegible]60[illegible]1970[illegible]

[illegible]100[illegible]1973[illegible]1990[illegible]400[illegible]50[illegible]20[illegible]90[illegible][68]

[illegible]Serra do Mar[illegible]Cubatão[illegible]São Paulo[illegible]Santos[illegible]1950[illegible]20[illegible]60[illegible]70[illegible]1980[illegible]10[illegible]40%[illegible]7%[illegible]“[illegible]”[illegible]10[illegible]35%[illegible]1980[illegible]“[illegible]”[illegible][69][illegible]Villa Parisi[illegible]1986[illegible][70][illegible]

[illegible]1964—1985[illegible]1984[illegible]1987[illegible]20%[illegible]30%[illegible]20[illegible]90[illegible][71]

[illegible]20[illegible]30[illegible]

## [illegible]

[illegible]1950[illegible]1998[illegible]18[illegible]10[illegible][72][illegible]Caracas[illegible]

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[1][illegible]“[illegible]”[illegible]

[2]Turco 1997[illegible]

[3][illegible]10[illegible]10[illegible]45[illegible]Salstein 1995[illegible]

[4]Nriagu 1994.

[5][illegible]Brimblecombe 1995[illegible]1982[illegible]

[6][illegible]734[illegible]King Piankhy[illegible]M.Lichtheim,Ancient Egyptian Literature.III.The Late Period[illegible]Berkeley[illegible]University of California Press,1980[illegible]cited in Brimblecombe 1995[illegible]

[7]Mamane 1987.

[8][illegible]Weeber 1990[illegible]

[9]Hong et al.1996[illegible]Gorres et al.1995[illegible]Nriagu 1990a and 1996[illegible]

[10]Turco 1997[illegible]137[illegible]

[11][illegible]Sumava Mountains[illegible]1640[illegible]Veseley et al.1993[illegible]11[illegible]Hartwell 1967[illegible]

[12]Hartwell 1967[illegible]500[illegible]11[illegible]1126[illegible]13[illegible]

[13]John Evelyn,Fumiugium[illegible]1661[illegible]Brimblecombe 1987[illegible]47–8[illegible]

[14][illegible]Peter Bell the Third,pt.2,stanza 1[illegible]

[15]Grimmett and Currie 1991[illegible]5[illegible]

[16]Clapp 1994[illegible]20[illegible]1[illegible]2%[illegible]4%[illegible]

[17]Clapp 1994[illegible]64–68[illegible]1/5[illegible]“[illegible]”[illegible]68[illegible]1840—1900[illegible]140[illegible]10%[illegible]

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[18]Walsh 1990□217□□□□□WRI 1996□86□

[19]1911□□□□□□□□□□U.S.Geological Survey□□□□□□□□□□□□□□□□□5□□□□□□□□□□□□□□
□Rosen 1995□354□□Cioc 1998□□□□□□□□□□□□□□□□□□

[20]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Stradling 1996□Platt 1995□Tarr and Zimring 1997□□□□□□□□□□□□□Brimblecombe and Bowler 1992□□□□□□□□□□□Morris-Suzuki 1994□

[21]Rosen 1995□385–6□□□□

[22]Tsuru 1989□19.

[23]Fang and Chen 1996□Srinanda 1984.

[24]Locke and Bertine 1986□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1850□□□□□□□□□□□□□□□□□□□□1890□□□□□□□□□□□□□□□□1890□□□□□□□□□□□□□□□□□□□

[25]□□□□□□□□□□□□□□□□□□□□□□□□1980□□□□□□2/3□□□□□□□□□□□□□□□□□□47%□□□□□□□39%□20□□80□□□□□□13%□□□□□□□□□□□□□Walsh 1990□217–8□□

[26]□□□□□□Walsh 1990□1995□□□□□□□□□□□□□22 June 1996□

[27]□□□□□□□□□□□OECD□□□□□□□1970□□1990□□□□□□□□□□7□□□□□□□□□□□□□□□10%
□OECD 1995□40,46□□

[28]□□□□□□□□□□□Living with the Car□□□□22 June 1996□

[29]□□□□□□□□□□□1000□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[30]Thomas 1995□305.

[31]1949—1970□□□□□□□□□□□□□□□□□□□□□□□1000□□Satake et al.1996□□

[32]□□□□□□□□□□□□□□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□”□□□Nriagu 1990a,1990b□Rosner and Markowitz 1985□□□USEPA 1995□□□□□□□□□Shen et al.1996□□□□Nriagu,et al.1996a□1996b□□□□□□□□□□□□□□□□□□□□□□□□□□□1990□□□□□□□□□□□□□□□□□□□□□1820□□□□□□□□Tolba and El-Kholy 1992□17□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1948—1968□□□□□□□□□□□□□□□□□□□□□80%□

[33]□□□□□□□□□□□MacDonald et al.1993□

[34]□□□□□□□□□□□□□□□□□1□□□□□□□□□□□□□□□□□□1970□□□□□□□□□□□□□□□□□□□□□□□□□2□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[35]□□□□□□Brimblecombe 1987□Eggleston et al.1992□Stradling and Thorsheim 1999□□□□□□□□Davidson 1979 and Tarr 1996□

[36]Zirnstein 1994□307.

[37]1991□□□□□□□□□□□□□□□□□□□□12□□□□□□□□□□□□□□10%□□□□□□□□17 September 1994□91□□

[38]Jean Pfaelzer,ed.,1995,A Rebecca Harding Davis Reader□Pittsburgh□University of Pittsburgh Press□□3.

[39]Our America□117□Cronon 1991□12□□□□19□□□□□□□□□□□□□□□□“□□□□□□”□Cronon 1991□392□□□□

[40]James Parton□Davidson 1979□1037□□□

[41]□□□□□□□Tarr and Zimring 1997□□□□□□□□□□□□□□□□20□□40□□□□□□□□□□□□□□□□□□

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[43]Eggleston et al.1992□Powell and Wharton 1982□Schulze 1993□Stern 1982□□□□□□Herz 1989□□□□□□Belfast□□□□□□□□20□□90□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[44]Brimblecombe 1995.

[45]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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[47]20□□90□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Lents and Kelly 1993;Levinson 1992□19–26;Turco 1997□148–63;WRI 1996□68–9□□1992□□□□□□□□□□□□□□□1970□□□□10%□

[48]□□□□□□□□□□□Sorocos 1985 and Leontidou 1990□

[49]Pelekasi and Skourtos 1992□24□1997□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[50]□□□□□□□□□□□Pattas et al.1994□Katsoulis 1996□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□2□□3/4□□□□20□□□□□□1990—1997□□□□□□□□□□□□□□□□□□□□□□□

[51]Papaioanniou 1967□□□□□□□□□□□□□□□□Klidonas 1993□85–6□□□1931—1984□□□□□□□□□□□□

[52]Cartalis and Varotsos 1994.

[53]□□□□□□□□□□□□□Pelekasi and Skourtos 1992□90–122□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Dede 1993□□□□□□□□□□□□□□□□□

[54]Klidonas 1993□92–4.

[55]Mantis and Repapis 1992□Sifakis 1991□□□Moussiopulos et al.1995□□□□□□Atmospheric Environment,1995,29□3573–719□10□□□□□□□□□□□□□□□□□□□□□□1986□□□□□Viras et al.1995□□□□□□□□□□□□□□Katsouyanni et al.1990 and Pantazopoulou et al.1995□□□□□□1975—1982□□□□□□□□□□□□□

[56]□□□□□Ezcurra 1990a□1990b□Ezcurra and Mazari-Hiriart 1996□Levinson 1992□27–36□□□WHO/UNEP 1992□155–64□

[57]□□□□□□□□□□□18□□□□□□□□□□□□□□□□□Garfias and González 1992□□1923□□□□□□·□□□□Alfonso Reyes□□□□□“□□□□□”□la región más transparente del aire□□1940□□□□□□□□□□□□□□□□□20□□50□□□□□□·□□□□□Carlos Fuentes□□□□□□□□□□□□□□□□□□□□□□□□

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[58]Garza Villareal 1985□133–94.

[59]□□□□□□□□□□□□30□70□□□□□□□□□□□900□□□□□“□□”□□□□□□□□□□□□□□□□□□□□□□□□□

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[61]□□□□□□□□World Resources Institute□□□□20□□90□□□□□□□□□□□□□□□6400□□□WRI 1996□22□□1990□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□11□□□□□□□□□□□GDP□0.2%□WRI 1996□24–5□□□□□□□□□□□□□□□□□□□1.25□□□□□□□□□□1100□□

[62]□□□□□□□□4 March 1993□A1□□□□□Pick and Butler 1997□202□□□□□□□□

[63]1995□□□□□1/3□□□□□□□□□□□□□□□□□□□□□□□□Nemecek 1995□Guzman et al.1996□□□20□□90□□□□□□□Lacy 1993□Restrepo 1992□Simon 1997□77–82□

[64]□□□□□□□□□□Anderson 1995□WHO/UNEP 1992□91–98□Centre for Science and Environment 1982□74–90□

[65]Anderson 1995□313□□□

[66]Anderson 1995□323.

[67]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□WHO/UNEP 1992□

[68]Türkiye Çevre Sorunlari Vakfi1991 □ 50–58□Levin son 1992 □ 42–48□Tunceland Ungör 1996.

[69]□□Findlay 1988 and Levinson 1992□□□□□□□□□□

[70]Bohm et al.1989.

[71]Findley 1988 □ 52–68□Klumpp et al.1996□Levinson 1992 □ 37–42 □ Dean 1995□324–9□□□□□□□□□□

[72]Turco 1997□4□1995□□□□□Dietrich Schwela□□□11□□□□□□□□□□□□□WRI 1996□1□□

# [illegible]3[illegible] [illegible]

[illegible]

——[illegible]·[illegible]Walt Whitman[illegible]*Song of Myself*[illegible]

[illegible]20[illegible]

## 1870[illegible]

[illegible]——[illegible]

[illegible]1870—1914[illegible]Rio Tinto[illegible]19[illegible]70[illegible]“[illegible]”[illegible]1888[illegible]45[illegible]1914[illegible][1][illegible]

[illegible]20[illegible]Ilo[illegible]1888[illegible]20[illegible]20[illegible]1972[illegible][2][illegible]1960[illegible]200[illegible][3][illegible]Norilsk[illegible]1935[illegible]20[illegible]80[illegible][4][illegible]Murmansk[illegible][5]

[illegible]19[illegible]Donetsk[illegible]Magnitogorsk[illegible]Katowice[illegible]1975[illegible]20[illegible]“[illegible]”[illegible]

[illegible][6] [illegible]1500[illegible]Emscher[illegible]1850[illegible]1910[illegible]1.1[illegible]40[illegible]Krupp[illegible]Thyssen[illegible][7]1900[illegible]

1923[illegible]1923[illegible]

[illegible]1923[illegible]
[illegible]



[illegible]Duisburg[illegible]
[illegible]1952[illegible]

[illegible]1961[illegible]1980[illegible]

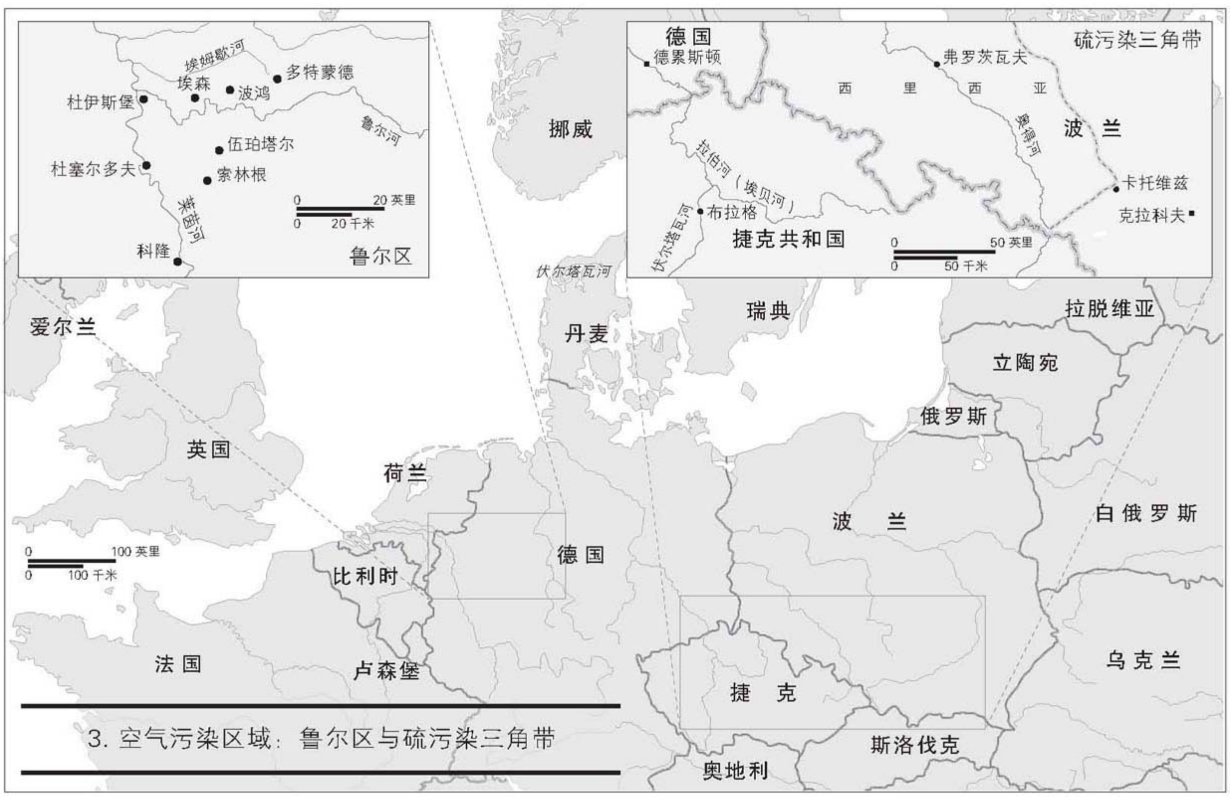
[illegible]20[illegible]20[illegible]1929[illegible]Solingen[illegible]18[illegible]1880[illegible]1930[illegible]1944—1945[illegible]1945—1948[illegible]20[illegible]50[illegible]

1961[illegible]·[illegible]Willy Brandt[illegible]20[illegible]60[illegible]1966—1969[illegible]20[illegible]80[illegible]

[illegible]20[illegible]60[illegible]30[illegible]20[illegible]90[illegible]1948[illegible]

[illegible] [illegible]Krakow[illegible]Tatra[illegible]1796[illegible]Gleiwitz[illegible]1900[illegible]

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3. 空气污染区域：鲁尔区与硫污染三角带

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[illegible] 20 [illegible] 70 [illegible] 6‰ [illegible] 7‰ [illegible] [10]

1970 [illegible] 20 [illegible] 80 [illegible] 1990 [illegible] 5 [illegible]

[illegible] 1950—1970 [illegible] “[illegible]” [illegible] 1989—1991 [illegible]

[illegible] 20 [illegible] 90 [illegible] 1989—1991 [illegible] 1985—1994 [illegible] 50% [illegible] Nova Huta [illegible] [11]

20 [illegible] 1970 [illegible] [12]

## [illegible]

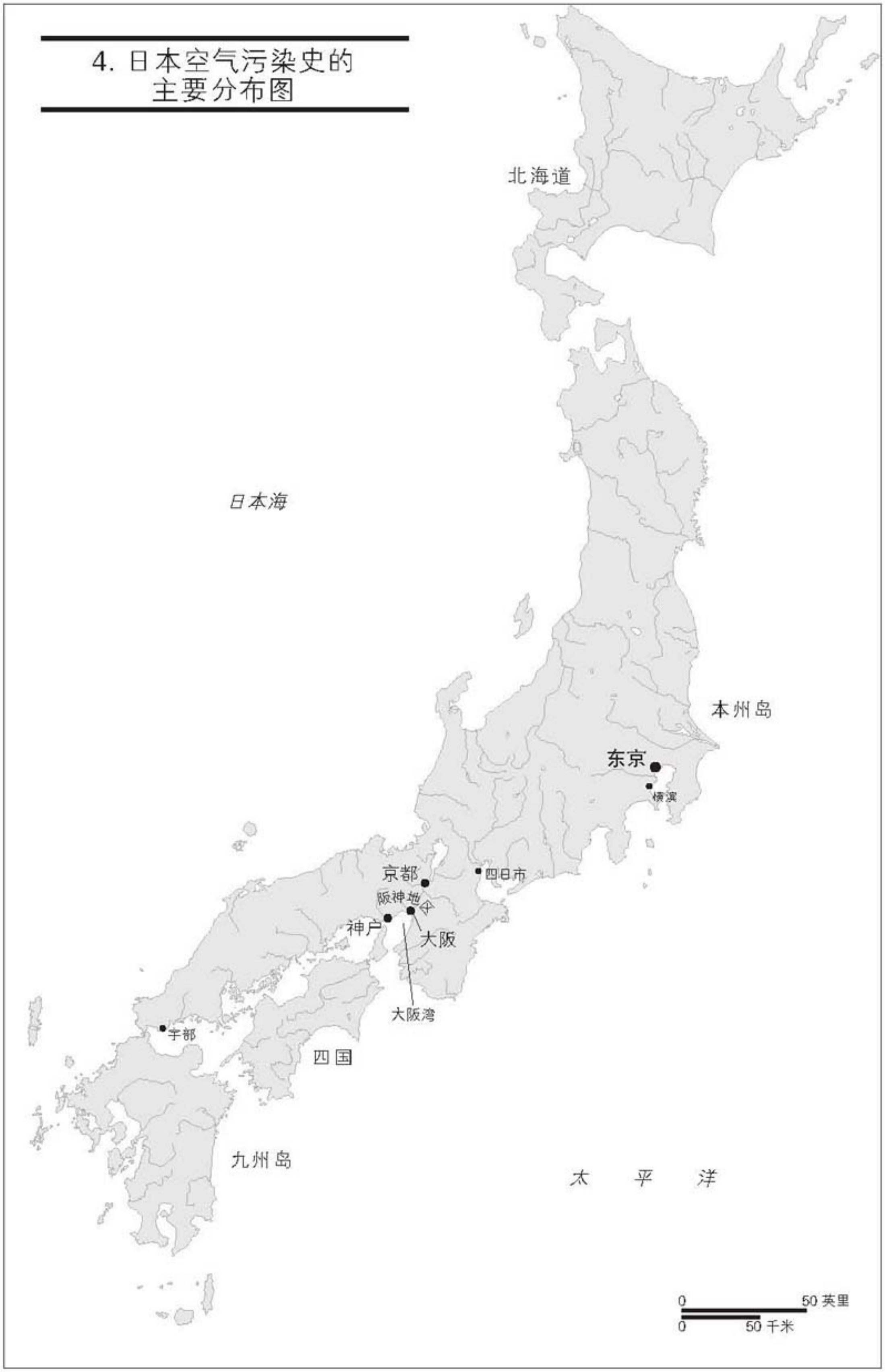
[illegible] 1970 [illegible]

[illegible]19[illegible]70[illegible]20[illegible]60[illegible]20[illegible][13][illegible]1868[illegible]1965[illegible]“[illegible]”[illegible][14][illegible]1975[illegible]1985[illegible]

1885—1925[illegible] [illegible]1890—1905[illegible]4[illegible]17[illegible]1885[illegible]40[illegible]1910[illegible]40[illegible]1925[illegible]48[illegible]1905[illegible]1914—1915[illegible]155[illegible][15]

[illegible]“[illegible]”[16][illegible]

1890—1970[illegible] [illegible]1880[illegible]19[illegible]80[illegible]62[illegible]1900[illegible]1904—1905[illegible]——[illegible]1912[illegible][17]


4. 日本空气污染史的
主要分布图
北海道
日本海
本州岛
东京
横滨
四日市
京都
阪神地区
神户
大阪
大阪湾
宇部
四国
九州岛
太 平 洋
0
50 英里
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50 千米

[illegible]“[illegible]”[illegible]

[illegible]1925[illegible]20[illegible]20[illegible]20[illegible]20[illegible]240[illegible]1932[illegible]1932[illegible]3.5[illegible]3[illegible]1931[illegible]1932—1934[illegible]1944—1945[illegible]

1945[illegible]1945[illegible]1935[illegible]1/4[illegible]1955[illegible][18]20[illegible]30[illegible]50[illegible]1970[illegible]1970[illegible]1901[illegible]1961[illegible]27[illegible]19[illegible]1970[illegible][19][illegible]Wirtschaftswunder[illegible]60[illegible]

1965—1985[illegible]

[illegible]20[illegible]50[illegible]

1954[illegible]1961[illegible]1962[illegible]

[illegible]1962[illegible]20[illegible]60[illegible]1967[illegible]1959[illegible]1972[illegible]20[illegible]60[illegible]

[illegible]20[illegible]60[illegible]1965[illegible]1970[illegible]1975[illegible]

[illegible]1960—1970[illegible]200[illegible]1970[illegible]EPA[illegible]“[illegible]”[illegible][20][illegible]MITI[illegible]1970[illegible]20[illegible]70[illegible]1978[illegible]1968[illegible]10%[illegible][21][illegible]

[illegible]20[illegible]90[illegible]20[illegible]60[illegible]20[illegible]30[illegible][22][illegible]1955[illegible]1975[illegible]1973[illegible]1983[illegible]1973[illegible]1947[illegible]1868[illegible][23]

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[illegible]20[illegible]20[illegible][24][illegible]

[illegible]19[illegible]60[illegible]Henrik Ibsen[illegible]1828—1906[illegible][25][illegible]20[illegible]60[illegible][26][illegible]Bratislava[illegible]critical load[illegible]10[illegible]

1950—1958□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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1975□□□1950□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1994□□

[illegible][33][illegible]

[illegible]1985[illegible]——[illegible]

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[illegible]20[illegible][37]

20[illegible]70[illegible]3[illegible]6[illegible]2%[illegible]3%[illegible][38][illegible]

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[illegible]20[illegible][40]

[illegible] [illegible]20[illegible]“[illegible]”[illegible]

[illegible]sycamore[illegible]19[illegible]20[illegible]Tashkent[illegible]1970[illegible][41]

[illegible]anthracosis[illegible]silicosis[illegible]

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[illegible]19[illegible]20[illegible]1970[illegible]20[illegible]90[illegible]1/4[illegible][43][illegible]“[illegible]”[illegible]Waldsterben[illegible][44][illegible][45]

[illegible]20[illegible]1960[illegible]1920[illegible]

[illegible] [illegible]20[illegible]8[illegible]25[illegible]Acropolis[illegible]2400[illegible]1974[illegible]Piazza della Signoria[illegible]20[illegible]90[illegible]90[illegible]1970[illegible][46]

[illegible]1980[illegible]Agra[illegible]Tikal[illegible]

[illegible]100[illegible]Giza[illegible]4000[illegible]5[illegible]5[illegible][47] [illegible]

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[illegible]20[illegible]21[illegible]20[illegible]20[illegible][50]

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[52]

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1940—1975□□□□□□□□□□□□□□□□□□□10□□□□□□□9□□□□1987—
1997□□□20□□90□□□□□14□□□□□□□10□□[53]□□□□□□□□□□□□□□□
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20[illegible]10[illegible]25[illegible]20[illegible]21[illegible]

20[illegible]90[illegible]21[illegible]1[illegible]5[illegible]1[illegible]10[illegible][58][illegible][59][illegible]——[illegible]——[illegible]21[illegible][60]

[illegible] [illegible]99%[illegible][61][illegible]10[illegible]

[illegible]1930—1931[illegible]·[illegible]Thomas Midgley,Jr.[illegible]Freon[illegible]

[illegible]1889[illegible]Beaver Falls[illegible]Dayton[illegible]Columbus[illegible]1921[illegible]1923[illegible]ethyl gasoline[illegible]

[illegible]Frigidaire[illegible]1930[illegible]1940[illegible]1944[illegible][62]



[illegible]20[illegible]30[illegible]40 [illegible]1950[illegible]2[illegible]1970[illegible]75 [illegible]1974[illegible]·[illegible]Sherwood Rowland[illegible]·[illegible]Mario Molina[illegible]1985[illegible]J.C.Farman[illegible][63][illegible]1960—1995[illegible]10%[illegible][64]

[illegible]B[illegible]B[illegible]20[illegible]70[illegible]UNEP[illegible]1985[illegible]1987[illegible]1990[illegible]1992[illegible]1995[illegible]1988[illegible]75%[illegible]100%[illegible]1986—1994[illegible]80%[illegible]

[illegible]2087[illegible]10[illegible]20[illegible]“[illegible]”[illegible]1970[illegible]2070[illegible][65][illegible]10[illegible]50[illegible]

[illegible]“[illegible]”[illegible]25[illegible]100[illegible]200[illegible][66][illegible]1[illegible]2[illegible]

[illegible]“[illegible]”[illegible][67]

20[illegible]20[illegible]12[illegible]20[illegible]

## [illegible]

20[illegible]1975[illegible]Sputnik[illegible]near-space[illegible]3[illegible]150[illegible][68]

## [illegible]

20[illegible]

[illegible]20[illegible]

[illegible]

[illegible]20[illegible]40[illegible]1975[illegible]·[illegible]Samuel Johnson[illegible]

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[1]Kaplan 1981[illegible]38–47.

[2]Ripley et al.1996[illegible]170–80[illegible]Dudka et al.1995[illegible]381[illegible]1972[illegible]Inco[illegible]1%[illegible]1500[illegible]1974[illegible]Cox 1982[illegible]Quinn 1988[illegible]1930[illegible]Quinn 1989[illegible]

[3]Vizcarra Andreu 1989[illegible]1994[illegible]Murley 1995[illegible]284[illegible]

[4]Peterson 1993[illegible]13[illegible]Lincoln 1994[illegible]403[illegible]

[5][illegible]WRI 1996[illegible]206[illegible]35[illegible]15[illegible]Kotov and Nikitina 1996[illegible]15%[illegible]Gytarsky et al.1995[illegible]3200[illegible]

[6][illegible]Br.ggemeir 1994 and 1990[illegible]Brüggemeir and Rommelspacher 1992[illegible]

[7][illegible]Wilhelmine Germany[illegible]1871—1918[illegible]Gilhaus 1995[illegible]Spelsberg 1984[illegible]

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[9]1990□□□□□□1/3□Carter 1993b□□

[10]Trafas 1991□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Majkowski 1994□□□□□□□Bobak and Feachem 1995□□□□□□□□□□□□□□20□□80□□□□□3%□□□□□

[11]Carter 1993a and 1993b□Klarer and Moldan 1997□Stanners and Bourdeau 1995□ch.4 et Passim□Trafas 1991□□□□□□□Bobak and Feachem 1995□Moldan 1997□

[12]Dominick 1998□□□□□□□□□□

[13]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□□□□□□

[14]□□□□□□□□□□□□□□Hashimoto 1989□

[15]□□□□□□□□□□□□□□□□□□□□□□□□□□□□Okada 1990□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Miura 1975□286–305□□

[16]Morris-Suzuki 1994□203□□□□

[17]□□□□Miura 1975□244–56□

[18]□□□□Ibid.37□

[19]□□□□□□Hashimoto 1989□Morris-Suzuki 1994□202–7□

[20]□□Nishimura 1989□v□

[21]Hashimoto 1989□42.

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[23]□□□□□□Hashimoto 1989□Morris-Suzuki 1994□□□Tsuru 1989 and 1993□Hoshino 1992□□□□□□□□□□□□□□□□□□□Krishnan and Tull 1994□Broadbent 1998□

[24]□□□□1980□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1:1□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Graedel et al 1995□

[25]Brimblecombe et al.1986.

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[27]Murley 1995□387□□□□1980—1992□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□75%□□□□□□□□□□□□□□□□□+27%□□□□□□□□□□□

[28]Freemantle 1995□□□□□□□□□□□

[29]Hires□□□□□□□□□□4.38□□□□□□3.32□1982□□□□□□□□□□□□□4.2□□□□Ponting 1991□366□□□□□□□□□□□□□□□□□□□□□1.5□□□□□□□□□2.4□□□□□□□□1.0□□□□

[30]Kotamarthi and Carmichael 1990□20□□□90□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Aamlid 1990□Ayers and Yeung 1996□Elder 1992□Hashimoto et al.1994□Mason 1992□Rodhe 1989□□Stanners and Bourdeau 1995□ch.4 and 31□

[31]□□Rodhe et al.1995□Rodhe 1989□□□□□□□□□□□□□□□□□□1995□□□□□□□□□“□□□□□□□”□□□□□

[32]Freemantle 1995□11–2□□□□□□□□□2.5%□□□□□

[33]□□□□□□□□□4.6□□□□□□□□□□□□5.5□10□□Rodhe et al.1995□□□□□□□□□7.0□□□□□□□□□□□□□□3□H□□□□□□□□500□□□□□□□□□□□□□□Laj et al.1992□□□Science of the Total Environment□□,1995□160–1□□□□□□□□□□□□□□Barrie 1986□Barrie et al.1985□Shaw 1995□1870—1975□□□□□□□□□□□□□□□□□□□□□□1990□□□□□□□□□□□□□□□□□□□5□10□□□Husar and Husar 1990□416□□

[34]□□□□□□□WRI 1996□22 and Hall 1995□77□□□□

[35]Murray and Lopez 1996□28□□□□□vol.9□□□□□

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[38]WRI 1996□64–7□□□□□□□□□□Natural Resources Defense Council□□1996□□□□□□□□□□□□□□6.4□□□□□□□

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[41]Gilbert 1991□33–40□□□Greg Maggio□□□□□□□□□□□□□□□□□□□□□20□□60□□□□□□□□□□□□□□□□□□□□□□□□□□Lodz□□□□□□□□□□□□□□□□□□□

[42]Fitter 1946□179–184□□□□□□□□□□□□1996□11□12□□C1□C6□□□□□□150□□□□□Lancashire□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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[46]U.N.Economic commission for Europe 1992□53–81□Kucera and Fitz 1995□Matson and Miller 1991□Norwich 1991□Sikiotis and Kirkitsos 1995□Trudgill et al.1990□□□□□Science of the Total Environment□□□1995,167□

[47]Salmon et al.1995□□□□□□□□Deshpande et al.1993□□□□□□□□Keskinler et al.1994□□□□□□□□□□Erzurum□□□□□□□□□□□□□□□4.2□□□□□□□□□□□□□□□□□□□□□□□□

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[50]□□□□□□de Gruijl 1995□IPCC 1996□Turco 1997□

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[52]IPCC 1996 1□5□□□□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”□□□□□□□□□□□□U.S.Global Change Research Program□1998□14□□□□□□□□□□“□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□”

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[54]Mann et al.1998□

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[56]□□Dennis 1996□165□1995□□□□□□□Larsen Ice Shelf□□□200□□□□□□□□□□□□□□□□□□□□□□□

[57]Berz 1990.

[58]2100□□□□□□□□□□□□□□□1□5□□□□□□□□□□□□□□□□□□□□□IPCC 1996□

[59]Rosenzweig and Hillel 1995□

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[64]□1979—1992□□□□□□□□□□□□□45—55□□□□□DNA□□□□□□□□□□□4%□9%□□□U.S.Global Change Research Program 1998□37□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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[66]NASA 1991□□□□□□2040□□□□□□20□□□□□□□□

[67]De Gruijl 1995□□□□□□□French 1997□

[68]□□□□□□□□Scheraga 1986□□□□□□□□□1997□3□29□□87–8□□□□□□□□□□□□□□□□□□□□□□1997□□□□□□□□8649□□□□□□□□□□□□□□□□200□□□□□□□□

# [illegible]4[illegible] [illegible]

[illegible]

——[illegible]

[illegible]

## [illegible]

[illegible]Samuel Taylor Coleridge[illegible]*Rime of the Ancient Mariner*[illegible]“[illegible]”[illegible]

[illegible]14[illegible]97%[illegible][1][illegible]50[illegible]69%[illegible]98%[illegible][2][illegible]1%[illegible]9[illegible]1/4[illegible]Lake Baikal[illegible]

[illegible]4[illegible]2/3[illegible]1.4[illegible]2000[illegible]20[illegible]30[illegible]10[illegible]5[illegible]Cheerapunji[illegible]9000[illegible]6[illegible]6[illegible][3][illegible]

## [illegible]

[illegible]9000[illegible]2000[illegible]

[illegible]1700[illegible]7[illegible]110[illegible]90%[illegible]4.1[illegible]1700[illegible]

[illegible]1990[illegible]1700[illegible]40[illegible]20[illegible]9[illegible]4[illegible]20[illegible]90[illegible]1900[illegible][4][illegible]20[illegible]70[illegible]1980[illegible]4000[illegible]1995[illegible]1/10[illegible][5]

□4.1 □□□□□□□□1700□□20□□90□□□

| | | | 用途[a] | | |
|---|---|---|---|---|---|
| 年份 | 用量（立方千米） | 人均用量 | 灌溉（%） | 工业（%） | 都会（%） |
| 1700 | 110 | 0.17 | 90 | 2 | 8 |
| 1800 | 243 | 0.27 | 90 | 3 | 7 |
| 1900 | 580 | 0.36 | 90 | 6 | 3 |
| 1950 | 1360 | 0.54 | 83 | 13 | 4 |
| 1970 | 2590 | 0.70 | 72 | 22 | 5 |
| 1990 | 4130 | 0.78 | 66 | 24 | 8 |
| 2000[b] | 5190 | 0.87 | 64 | 25 | 9 |

□□□□□L’vovich and White 1990□Shiklomanov 1993

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1950[illegible]

[illegible]4.2 [illegible]1900—1990[illegible]

| | | 占全球淡水用量比例（%）[a] | | |
|---|---|---|---|---|
| | 河流径流（占全球%） | 1900年 | 1950年 | 1990年 |
| 亚洲 | 32 | 71 | 63 | 60 |
| 欧洲 | 7 | 12 | 13 | 13 |
| 北美 | 18 | 10 | 17 | 18 |
| 非洲 | 10 | 5 | 5 | 6 |
| 南美 | 26 | 2 | 2 | 4 |
| 大洋洲 | 5 | ~ | 1 | 1 |
| | | ≈100 | ≈100 | ≈100 |

[illegible]L'vovich and White 1990[illegible]Shiklomanov 1993

[illegible]a[illegible]100%[illegible]

# [illegible]

[illegible]——[illegible]——[illegible]19[illegible]19[illegible]50[illegible]19[illegible]80[illegible]

[illegible]Golden Horn[illegible]1453[illegible]16[illegible]Sinan[illegible]20[illegible]30[illegible]1600[illegible][6]20[illegible]

[illegible]1923[illegible]120[illegible]20[illegible]20[illegible]20[illegible]50[illegible]10%[illegible]20[illegible]60[illegible]70[illegible]1980[illegible]1990[illegible][7][illegible]

[illegible]19[illegible]1848[illegible]3[illegible]1900[illegible]1885—1886[illegible]9[illegible]12%[illegible]1891—1895[illegible]2[illegible]Calumet River[illegible]



5. 水质史主要分布图
华盛顿湖
普捷湾
西雅图
华盛顿湖
莱茵河盆地
荷兰
科隆
波恩
比利时
卢森堡
法国
德国
巴塞尔
菲斯河
塞布河
拉巴特
菲斯
渡良濑川盆地
足尾
东京
北冰洋
芝加哥
密歇根湖
切萨皮克湾
墨西哥市
太平洋
亚马孙河
大西洋
君士坦丁堡
黑海
地中海
卡拉奇
达喀尔
马德拉斯
首尔
印度洋
刚果河／扎伊尔河
地中海
罗讷河
里昂湾
的里雅斯特
塞萨洛尼基
雅典
伊兹密尔
伊斯肯德伦
突尼斯
黑海
恒河盆地
恒河
瓦拉纳西
加尔各答
孟加拉湾

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[illegible] [illegible]1/4[illegible][15]1900[illegible]1886[illegible]1896[illegible]·[illegible]“[illegible]”[illegible]“[illegible]”[illegible][16][illegible]1990[illegible]4.5[illegible]7000[illegible]1990[illegible]1900[illegible]20[illegible]5[illegible]10[illegible]

[illegible]Benares[illegible]20[illegible]80[illegible]3000[illegible]6[illegible]20[illegible]60[illegible]20[illegible]60[illegible]1985[illegible]“[illegible]”[illegible]Ganga Action Plan[illegible]1990[illegible][17][illegible]



[illegible]1985[illegible]20[illegible]80[illegible]3000[illegible]

[illegible] [illegible]19[illegible]1866[illegible]Calder[illegible]Bradford[illegible]1.8[illegible][18]

19[illegible]20[illegible]60[illegible]1869[illegible]“[illegible]”[illegible]River Irwell[illegible]20[illegible]50[illegible][19]1972[illegible]

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[illegible]1300[illegible]1765[illegible]1828[illegible]*Cologne*[illegible]

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[illegible]150[illegible]1880[illegible]

[illegible]19[illegible]19[illegible]90[illegible]1914[illegible]5[illegible]1931[illegible]

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[illegible]1897—1898[illegible]1900[illegible]1904—1905[illegible]1907[illegible][24][illegible]450[illegible]1955[illegible]1972[illegible]1974[illegible][25]

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[illegible]13[illegible]Merinid[illegible]1912[illegible]20[illegible]60[illegible]Saïs plain[illegible]1990[illegible]5[illegible]10[illegible]·[illegible]50[illegible]20[illegible]

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[illegible]1850[illegible]Lake Mendota[illegible]1850[illegible]algal bloom[illegible]1898[illegible]1930[illegible]1946[illegible]20[illegible]60[illegible]1945[illegible]Lake Erie[illegible]

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| 项目 | 北部 | 南部 |
|---|---|---|
| 人口（万） | 7300 | 5000 |
| 城市化比率（%） | 69 | 47 |
| 有污水处理的城市（%） | 70 | 50 |
| 废弃物（百万立方米） | 2295 | 544 |
| 注入的氮数量（千吨） | 128 | 48 |

[illegible]Grenon and Batisse 1989[illegible]245-6

[illegible]Grenon and Batisse[illegible]

[illegible]20[illegible]Thessalonnki[illegible]1990[illegible]1980[illegible]1965[illegible][38]

[illegible]Gulf of Izmir[illegible]Gulf of Iskenderun[illegible]Alexandretta[illegible]1913[illegible][39][illegible]20[illegible]

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[illegible]20[illegible]1872—1988[illegible]15[illegible]1969[illegible]1988[illegible]1969[illegible][41][illegible]Poisidonia oceanica[illegible][42][illegible]

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1975[illegible]20[illegible]70[illegible]1975[illegible]1973[illegible][44][illegible]1980[illegible]——[illegible]——[illegible]

[illegible]1975[illegible]“[illegible]”[illegible]Mediterranean Action Plan[illegible]2000[illegible]“[illegible]”[illegible][45][illegible]1976[illegible]20[illegible]80[illegible]

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1945 1950 1992 60% · Thor Heyerdahl 1951—1952 1969 18 57 40 Cape Verde Barbados 18 1970 —— —— [47]

19 1970 1973—1983 600 100 Chesapeake Bay 1954 1972 [48] 20

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[illegible]1800[illegible]19[illegible]20[illegible]

20[illegible]19[illegible]20[illegible]

[illegible]20[illegible]1948[illegible]

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[1][illegible]Shiklomanov 1990,1993[illegible]Postel 1992[illegible]

[2][illegible]

[3]Rao 1989[illegible]1960[illegible]

[4][illegible]

[5]Gleick 1993[illegible]396[illegible]1998[illegible]11[illegible]29[illegible]U.S.Geological Survey[illegible]

[6]Orhonlu 1984[illegible]78–82[illegible]Çeçen 1992[illegible]Pinon and Yerasimos 1994.

[7][illegible]Özis 1987[illegible]Lake Sapanca[illegible]20[illegible]80[illegible]

[8]Changnon and Changnon 1996[illegible]104.

[9][illegible]1994,2[illegible]75–84,101–12[illegible]Stout and Ackermann 1987[illegible]Changnon 1994[illegible]·[illegible]Peter Campbell[illegible]Changnon and Changnon 1996[illegible]

[10][illegible]1829[illegible]Poughkeepsie[illegible]1879[illegible]1800[illegible]Goubert 1989[illegible]Büschenfeld 1997[illegible]

[11]Outwater 1996□133–47□□□Guayacochea de Onofrí1987□□□□□□□□□□□□□Mendoza□□□20□□□□□□□□□□□□

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[13]□□□□□□□□□Windhoek□20□□70□□□□□□□□□□□□□□□1/3□□□□□□□□□□□□□□□□□□15th ed.,1976,14□753□□□□□□□□□Goldman 1972□96–101□

[14]GEMS 1989□274□Headrick 1988□145–59□Smil 1984□100□Yeung 1997□□□□□□□□□Sundaramoorthy et al.1991□

[15]□□□□□□Ahmed 1990□Basu 1992□Ghose and Sharma 1989□□Varady 1989□

[16]Twain 1899,2□192–3□

[17]Ghose and Sharma 1989□41–4□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Meybeck and Helmer 1989□294□□□□□□□□□□□20□□80□□□□□□990□□□□□□□□□□□□

[18]□□□□□□□□□□□□□□□□Clapp 1994□74–5□

[19]Sherlock 1922□295□□□1869□□□□□□□Sheail 1997□207□□□1950□□□□□□1979□□□□□□□□□□□□□□□□□□□□1860□□□□□12%□Meybeck 1979□241□□

[20]Ponting 1991□364□□□□

[21]Behre et al.1985.

[22]PCBs□□□□□□□polychlorinated biphenyl□□1929□□□□□□□□□□□□□□□□□□□DDT□□□□□□□□□dichlorodiphenyltrichloroethane□□□□□□□1874□□□□1942□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Reihelt 1986□□□□□□□□□□□□PCBs□□□□□□11□□□□□□□6□□Science News,14 September 1996□165□□Joseph Jacobson and Sandra Jacobson□□□□□

[23]□□□□□□□□□□Friedrich and Müller 1984□GEMS 1989□280□Habereer 1991□Lelek 1989□Malle 1996□Meybeck 1979□Reihelt 1986□van der Weijden and Middleburg 1989□□□Van Urk 1984□□□140□□□□□□□□□□□1974□□□□□□Wood 1982□118□□

[24]Nimura 1997□21.

[25]Hashimoto 1989□Miura 1975□259–86□Notehelfer 1975□Shoji and Sugai 1992□Tsuru 1989.

[26]□□□□□□□□□Kettani 1993□□□□□□p.663□

[27]Barica 1979□Bonomi et al.1979□NRC 1992□188–91□ReVelle and ReVelle 1992□395–7□Schröder 1979□□□□□□□□□□□□Edmondson 1991□

[28]Gorman 1993□106–7□□□□□□□□□□□□□□□□□□□□□□□□□□□□1%□

[29]Elmgren 1989□Larssen et al.1985□Linden 1990□8□Ambio,1990,19□3□□□□□□□□□□□□□□

[30]Adler et al.1993□Alderton 1985.

[31]□□□□□□□□□□□□□□□□□□□□□20□□30□□□□□40□□□□□□□□□□□□□□□□□50□□□□1965□□□□□□□□□□□□□□□□□□□□□Nishigaki and Harada 1975□□

[32][illegible]1990[illegible]987[illegible]2239[illegible]2903[illegible]Ui 1992b[illegible]131,citing the Japanese Environmental Agency[illegible]

[33]1995[illegible]4[illegible]1.3[illegible]

[34]De Walle et al.1993a[illegible]59.

[35]Stanners and Bourdeau 1995[illegible]495.

[36]De Walle,et al.1993b[illegible]6,62–3[illegible]Le Lourd 1977[illegible]Stanners and Bourdeau 1995[illegible]118[illegible]20[illegible]80[illegible]50[illegible]

[37]Grenon and Batisse 1989[illegible]103–5[illegible]

[38]1982[illegible]Elefsis[illegible]PCBs[illegible]DDT[illegible]20[illegible]15[illegible]18[illegible]Vassilopoulos and Nikopoulou-Tamvakli 1993[illegible]Katsoulis and Tsangaris 1994[illegible]

[39]Tuncer et al.1993[illegible]1985[illegible]Türkiye Çevre Sorunlar1 Vakf1 1991[illegible]216–20[illegible]

[40][illegible]Vassilopoulos and Nikopoulou-Tamvakli 1993[illegible]432[illegible]

[41]Bethoux et al.1990[illegible]Marchetti and Rinaldi 1989[illegible]

[42]Stanners and Bourdeau 1995[illegible]120–1.

[43][illegible]Albaigues et al.1985[illegible]

[44]Molinelli-Cancellieri 1995.

[45]De Walle,et al.1993a[illegible]79.

[46][illegible]Antoine 1993 and Haas 1990[illegible]

[47]Earle 1995[illegible]254–55[illegible]Gorman 1993[illegible]34,39,114.

[48]Prager 1993[illegible]87–131[illegible]Gorman 1993[illegible]69–92[illegible]

# [illegible]5[illegible] [illegible]

[illegible]

——[illegible]

[illegible]

——[illegible]·[illegible]Ben Franklin[illegible]*Poor Richard’s Almanac*[illegible]

1908[illegible]Lake Victoria[illegible]Owen Falls[illegible]“[illegible]……[illegible]”[1]

[illegible]1946[illegible]1954[illegible]15[illegible]

[illegible]20[illegible]1850[illegible]symbolic politics[illegible]

[illegible]20[illegible]1900[illegible]

## [illegible]

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[illegible]19[illegible]10[illegible]3[illegible]20[illegible]30[illegible]Ogallala Aquifer[illegible]“[illegible]”[illegible][3][illegible]Texas Panhandle[illegible]100[illegible]1[illegible]2.5[illegible]

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6. 水源控制史的主要分布图

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[4]

[illegible]20[illegible]70[illegible]70%[illegible]90%[illegible]1000[illegible]1975[illegible]5[illegible]1984[illegible][5]

[illegible]fossil water[illegible]20[illegible]20[illegible]1951[illegible]40[illegible]1969[illegible]Muammar el-Qaddafi[illegible]Occidental Petroleum[illegible]·[illegible]Armand Hammer[illegible][6][illegible]250[illegible]“[illegible]”[illegible]Great Man-Made River[illegible]5%[illegible]Benghazi[illegible]1986[illegible]4[illegible]10[illegible]1980[illegible][7]

[illegible]Uttar Pradesh[illegible]1970—1985[illegible]2700[illegible]2300[illegible]1985[illegible]1970[illegible]1990[illegible][8]

[illegible]20[illegible]1920—1965[illegible]5[illegible]1961[illegible]Llobregat River[illegible]1965[illegible]1970[illegible][9]

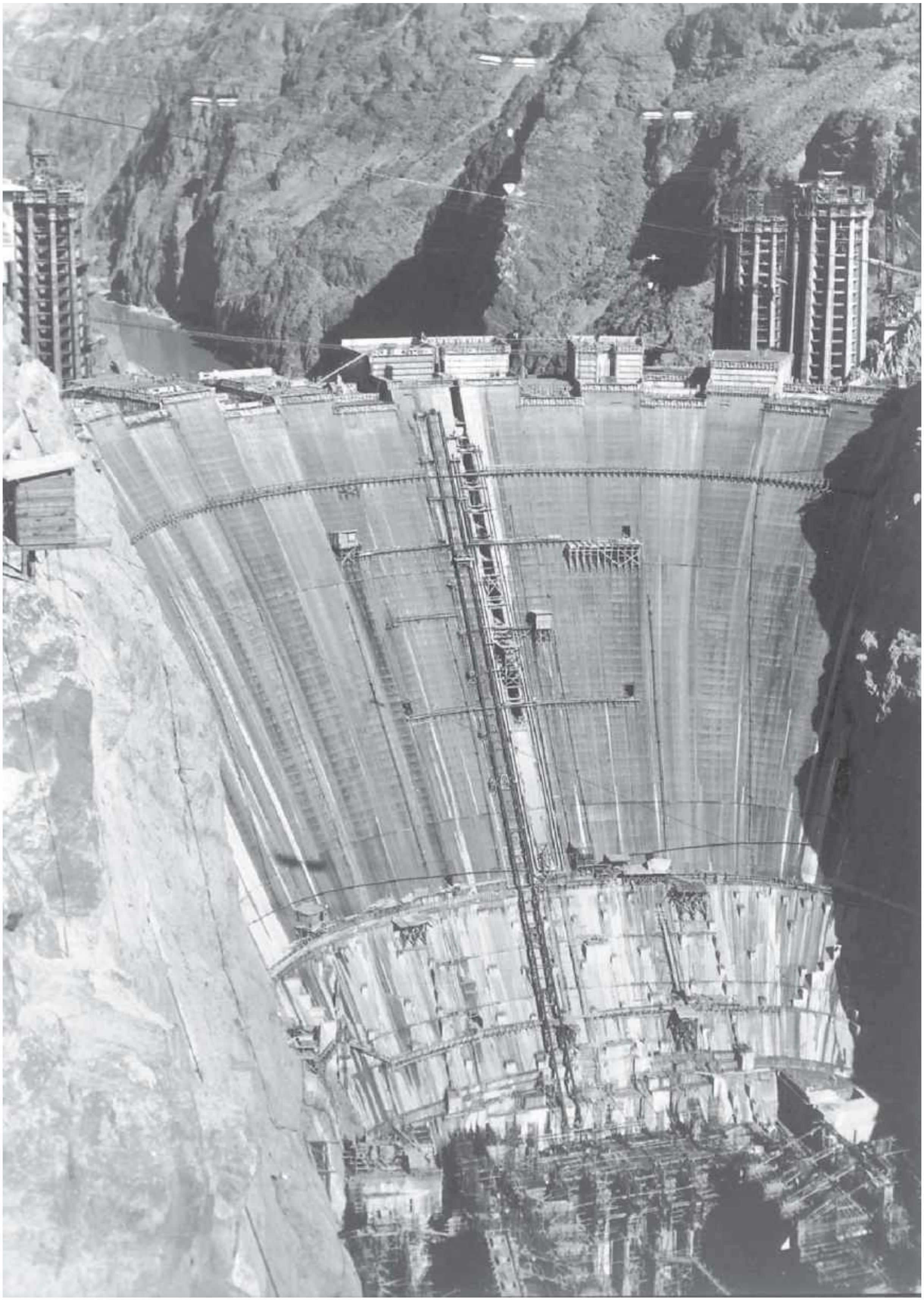
20[illegible]

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[illegible]4900[illegible]2[illegible]30[illegible][10]1850[illegible]19[illegible]20[illegible]

19[illegible]19[illegible]20[illegible]20[illegible]30[illegible]20[illegible]30[illegible]Boulder Dam[illegible]Hoover Dam[illegible]

[illegible] Gamal Abdel Nasser [illegible] 1956—1970 [illegible] Nkrumah [illegible] 1960—1966 [illegible] 1930—1970 [illegible][11]



[illegible]1934[illegible]20[illegible]30[illegible]1980[illegible]

[illegible]20[illegible]60[illegible]15[illegible]1968[illegible]20[illegible]90[illegible]2/3[illegible][12]

[illegible] 20[illegible]Sutlej[illegible]Punjab[illegible]“[illegible]”[illegible]3000[illegible]4500[illegible][13]

[illegible]1885[illegible]16—18[illegible][14][illegible]“[illegible]”[illegible]canal colonies[illegible]1947[illegible]1400[illegible]1915[illegible]

[illegible]1947[illegible]1947[illegible]1990[illegible]1600[illegible][15][illegible]

[illegible]1960[illegible]

——[illegible]19[illegible]60[illegible]20[illegible]60[illegible][16][illegible]80%[illegible]20[illegible]90[illegible][17]

[illegible]20[illegible]19[illegible]20[illegible]1947[illegible]2200[illegible]1974[illegible]3200[illegible]90[illegible]4500[illegible]5000[illegible]1/5[illegible]1975[illegible]“[illegible]”[illegible]1947—1982[illegible]15%[illegible][18][illegible]“[illegible]”[illegible][19]

[illegible]20[illegible][20][illegible]“[illegible]”[illegible]1947—1992[illegible]2000[illegible]20[illegible]60[illegible]Rihand[illegible][21][illegible]

1947[illegible]2[illegible]4[illegible]1955—1985[illegible]1300[illegible]1996[illegible]1/4[illegible][22][illegible]Western Ghats[illegible][23]

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20[illegible]50[illegible]4[illegible]1990[illegible]Muynak[illegible]90[illegible]24[illegible]20[illegible]1995[illegible]4[illegible]1.2[illegible]1970—1990[illegible]5[illegible]10[illegible]1990[illegible]1960[illegible]3/4[illegible]

[illegible]Karakum Canal[illegible]1100[illegible]Ashkhabad[illegible]1970[illegible]4/5[illegible]20[illegible]80[illegible]

[illegible]1986[illegible]1984[illegible]1986[illegible]1991[illegible][32]

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[illegible]

[illegible]5000[illegible][33][illegible]

[illegible]——[illegible]“[illegible]”——[illegible]·[illegible]1769—1849[illegible]1805[illegible]pasha[illegible]1842[illegible]1861[illegible]·[illegible]8[illegible]9[illegible]19[illegible]

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1882[illegible]1883—1907[illegible]Lord Cromer[illegible]·[illegible]1898[illegible]Baring Brothers[illegible]1902[illegible]1912[illegible]1934[illegible]1934[illegible]1/5[illegible][34]

[illegible]1876[illegible]khedive[illegible]·[illegible]·[illegible]

[illegible]Adrian Danino[illegible]1912[illegible]20[illegible]40[illegible]

1952[illegible]1918—1970[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible][35]

[illegible]evaporation zone[illegible]1949[illegible]

[illegible]1952[illegible]

[illegible]·[illegible]Anthony Eden[illegible]1897—1977[illegible]1952[illegible]1955[illegible]1955[illegible]1956[illegible]1956[illegible]10[illegible]

[illegible] 20 [illegible] 50 [illegible]
1960 [illegible] 1971 [illegible] [36]

[illegible] Lake Nasser [illegible] 150 [illegible] 1934 [illegible] 30 [illegible] 98% [illegible] [37] [illegible] 1977—1990 [illegible] 1/3 [illegible] [38] [illegible]

[illegible] 1963 [illegible] 50 [illegible] 1200 [illegible] 87 [illegible] 20 [illegible] 90 [illegible] [39]

[illegible] 3000 [illegible] 2/3 [illegible] 7500 [illegible] 20 [illegible] 2.4 [illegible] 19 [illegible] 5 [illegible] 8 [illegible] 1902 [illegible] 1964 [illegible] 70 [illegible] 90 [illegible] 1996 [illegible] 1/10 [illegible] [40]

[illegible]3[illegible]5[illegible]10[illegible]1975[illegible][41][illegible]

[illegible]25[illegible]2500[illegible]salt creep[illegible][42]

[illegible]1/6[illegible]20[illegible]70[illegible]90[illegible]

[illegible]20[illegible]·[illegible]5000[illegible]

[illegible]1959[illegible]5[illegible]Nubian[illegible]Lake Nubia[illegible]20[illegible][43]

[illegible]1964[illegible]——[illegible]10%——[illegible]

[illegible]1869[illegible]（Levant）[illegible]（Lessepsian migrant）[illegible]（Ferdinand de Lesseps）[illegible]（Indo-Pacific）[illegible][44]

[illegible]19[illegible]

1890[illegible][45][illegible]1/6[illegible]1/3[illegible]1890[illegible]（Apennines）[illegible]

[illegible]19[illegible]（Lombards）[illegible][46][illegible]1866[illegible]（Cavour Canal）[illegible]1861[illegible]1882[illegible]（channelization）[illegible]1870[illegible]1882—1914[illegible][47][illegible]

[illegible]“[illegible]”[illegible]revolution of the waters[illegible][48][illegible]19[illegible]90[illegible]“[illegible]”[illegible]Piedmont[illegible]8[illegible]20[illegible]·[illegible]Giuseppe Colombo[illegible]

[illegible][49]

[illegible]1885[illegible]1898[illegible]1905[illegible]1924[illegible]180[illegible]15[illegible]1000[illegible]1937[illegible]1890[illegible]Como[illegible]Maggiore[illegible]Guarda[illegible]19[illegible]1901—1927[illegible]3/4[illegible][50][illegible]1920[illegible][51][illegible]

1890[illegible]1896[illegible]20[illegible]30[illegible]1922—1943[illegible]1935—1936[illegible]1936—1938[illegible]1936[illegible]“[illegible]

[illegible]”[illegible]mare nostrum[illegible][52]

[illegible]·[illegible]Umberto Boccioni[illegible]1882—1916[illegible]

[illegible][53]

[illegible]1919[illegible]1890[illegible][54]

[illegible] 1900[illegible]——[illegible]San Joaquin-Sacramento River[illegible]——[illegible]Snake-Columbia River[illegible]1900[illegible][55]

[illegible]17[illegible]1900[illegible]

1900[illegible]Imperial Valley[illegible]Alamo Canal[illegible]1905[illegible]Salton Sea[illegible][56][illegible]

[illegible]1911[illegible]Salt River[illegible]
1935[illegible]1964[illegible]
19[illegible]

1964[illegible]1983[illegible]1917—1961[illegible]20[illegible]80[illegible]1500[illegible]

[illegible]7[illegible]20[illegible]Baja California[illegible]Sonora[illegible]1950[illegible]Morelos Dam[illegible]1973[illegible]1979[illegible]1905[illegible]·[illegible]20[illegible]

[illegible]20[illegible]50[illegible]Sierra Club[illegible]Audubon Society[illegible]Dinosaur National Park[illegible]Glen Canyon Dam[illegible]1964—1965[illegible]

[illegible]

[illegible]

[illegible]20[illegible]4.1[illegible]——[illegible]Tigris-Euphrates[illegible]Zambezi[illegible]la Plata[illegible][57]

[illegible]1900—1995[illegible]5000[illegible]2.5[illegible]5.1[illegible]

[illegible]5.1 [illegible]1900—1990[illegible]

| 年份 | 全球总面积（百万公顷） |
| --- | --- |
| 1800 | 8 |
| … | … |
| 1900 | 48 |
| … | … |
| 1950 | 94 |
| 1960 | 137 |
| 1970 | 168 |
| 1980 | 211 |
| 1990 | 235 |
| 1995 | 255 |

□□□□Gleick 1993□265□Postel 1999□41

□□□□□□□□□□□□□□1950—1980□□1950—1976□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□[58]□□1980□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□

20□□90□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1919□ □□□□□□1866—1925□□□□□□□□□70□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□100□□200□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□river dolphin□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□10%□□□□□ □□[59]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□1990□□□□□□□□□□□□□□16%□ □□□□□□□□30%□1995□□□□□□□□□□7%□□□□□□□□20%□□□□□□□□□ □□20□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1980□□□□□□ □□□□□□□□□□□1/4□□□□□□□□□□□□[60]□20□□90□□□□□□□□□□□□ 10%□□□□□□□1996□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□[61]□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□4000□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□[62]□□□□□□□□□□□□□20□□□□□□□□□□□□□



□□□□Mali□□□□□□□□□□□□□□N’Debougou□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□6□□□□□□□□□1.6□□□□□□□□□1950□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1950□

## □□□□□□□□□□

[illegible]20[illegible]

[illegible]1800[illegible]1800[illegible]1990[illegible]1/4[illegible]6%[illegible]7%[illegible][63][illegible]

[illegible]41%[illegible]18[illegible]19[illegible]1895[illegible]1927[illegible]Cairo[illegible]170[illegible]160[illegible]1928[illegible]

[illegible]1928[illegible]*Flood Control Acts*[illegible]1936[illegible]1932—1955[illegible]229[illegible]1951[illegible]1965[illegible]1969[illegible]1973[illegible]1990[illegible]26[illegible]60[illegible]1993[illegible]9[illegible]50[illegible]120[illegible]1993[illegible]90[illegible][64]




1927[illegible]170[illegible]Melville[illegible]



1927[illegible]50[illegible]1927[illegible]5[illegible]18[illegible]

[illegible]oxbow lake[illegible][65]

[illegible]20[illegible]60[illegible]

[illegible]16—17[illegible]20[illegible]1953[illegible]1630[illegible]the Fens[illegible]20[illegible]

[illegible]1900[illegible]
[illegible][66]

[illegible]19[illegible]Manitoba[illegible]1842[illegible]

[illegible][67]

[illegible]68[illegible][68]1870[illegible]1880[illegible]1000[illegible]1900—1920[illegible]1940—1970[illegible]1970[illegible]1700[illegible][69]

[illegible]1930[illegible]1960[illegible]1870[illegible]Central Valley[illegible]1880[illegible]Florida Everglades[illegible]160[illegible]1970[illegible]1780[illegible]15%[illegible]20[illegible]80[illegible]5300[illegible][70][illegible]20[illegible]1865[illegible]1/3[illegible][71]

[72] 19 Sundarbans 1880—1980 80 5 1970 1900—1980 1300 1920—1980 2/3 [73] 1980

20 1000 15% 60% 90% 90% 20 [74]

20 70 1983 Jonglei Canal Dinka 1998 1/4 Pantanal 20 90 20

[illegible]20[illegible]20[illegible]

[illegible]1916[illegible]Zuider Zee[illegible]1890[illegible]20[illegible]20[illegible]1932[illegible]60[illegible]13%[illegible]14%[illegible]300[illegible][75]

[illegible]1970[illegible]20[illegible]80[illegible]40%[illegible]19[illegible]70[illegible]1960—1980[illegible]1/5[illegible]10%[illegible]20[illegible]10[illegible]50[illegible][76]

## [illegible]

[illegible]20[illegible]20[illegible]18%[illegible]54%[illegible][77][illegible]1/3[illegible]

[illegible]20[illegible]20[illegible]

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[1]Worthington 1983[illegible]101[illegible]

[2][illegible]

[3]Opie 1993[illegible]30[illegible]acre-feet[illegible]Gleick 1993[illegible]449 and 162[illegible]30[illegible]

[4]Schwarz et al.1990[illegible]265–7[illegible]Opie 1993[illegible]

[5]Postel 1992[illegible]31–2.

[6][illegible]1981[illegible]Holcomb[illegible]6[illegible]Opie 1993[illegible]154[illegible]

[7][illegible]Hillel 1994[illegible]196–200[illegible]Allan 1994[illegible]75–6[illegible]

[8]Jayal 1985[illegible]96[illegible]Stanners and Bourdeau 1995[illegible]66[illegible]

[9]GEMS 1989[illegible]152[illegible]Smil 1993[illegible]42–4[illegible]Stanners and Bourdeau 1995[illegible]67[illegible]Walker 1990[illegible]289–90.

[10]Garbrecht 1987[illegible]Rouse 1963.

[11][illegible]

[12]NRC 1992[illegible]200[illegible]Petts 1990a,1990b.

[13][illegible]Neuvy 1991[illegible]173[illegible]

[14][illegible]Ali 1988[illegible]Agnihotri 1996[illegible]Gilmartin 1994[illegible]

[15]1993[illegible]80%[illegible]WRI 1996[illegible]241[illegible]

[16]Michel 1967[illegible]455–6.

[17]GEMS 1989[illegible]150[illegible]Hillel 1991[illegible]146–7[illegible]Agnihotri 1996[illegible]54[illegible]

[18]Thukral 1992[illegible]9[illegible]Centre for Science and Environment 1982[illegible]59[illegible]14%[illegible]1947—1979[illegible]

[19]Gadgil and Guha 1995[illegible]78.

[20][illegible]1950—1990[illegible]7[illegible]3[illegible]Mitchell 1995[illegible]196[illegible]1954—1979[illegible]12[illegible]

[21]Thukral 1992[illegible]13–14.

[22]Jayal 1985□97□1955—1985□□□□□□□□□□600□□□□□□□□□□□□700□□□□The Centre for Science and Environment 1982□6–7□□□□□□□□□□□□□□□□□□□□□□□1300□□□□□□□□□□□600□□□□□□□□□□□□□□1000□□□□□□□□□□□□□

[23]The Centre for Science and Environment 1982□56–69□□□□□□□□□□□□□□Whitcombe 1995□□□□□□□□□□□

[24]Baviskar 1995□Dr.ze et al.1997□Gadgil and Guha 1995□66–78.

[25]Moser 1894□□□□□□□□□□□□□□□□4□□□□□□□□□□□□1917□□□□□□□□□□□□□□Klige et al.1996□

[26]1930—1978□□□□□□□□3□□□1978—1994□□□□1.5□□Micklin 1995□279□□

[27]Kostin 1986□Shiklomanov 1990□38□Vendrov and Avakyan 1977□□□□□□□□□□□□□□□□□□□□□□□□□

[28]Gerasimov and Gindin 1977□61□Gleick 1993□70□□1929—1933□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Cecchini 1987□□

[29]Quoted in Precoda 1991□111.

[30]Gleick 1993□6□Smith 1995□267□1993□□□□□□30□37□□□□□□□1.5□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1960□□□□□□Klige et al.a1996□□

[31]□□S.Ospanov□personal communication,May 1998□□1998□□□□□50□□□□□20□□90□□□□□□□□□□□□□□□□□□□40□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5%□□Lubin 1995□297□

[32]□□□□□□Feshbach 1995□55–6□Micklin and Williams 1995□Peterson 1993□111–8□Postel 1996□□Precoda 1991□□□1998□5□□□□□□□□□□□□□□□□□Social Science Research Council□□□□□□□□□□□□□□□□□□□Weiner 1999□414–28□

[33]□□□shadoof□□□□□□□□□□□□□□□□□□□□

[34]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Waterbury 1979□88□

[35]□□□□□□□□Postel 1999□54□□□□□□1964□5□14□□□□□□□□□Waterbury 1979□98□□□

[36]□□□□□□□□□□□□□□□Hahn 1991,Collins 1990□□□Louis and Owen 1989□

[37]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Stanley 1996□□

[38]□□□□□□□□□□□18%□□□□□53%□□□□□□□□□□□□□□□□□Said 1993□241□□

[39]Kishk 1986□Stanley 1997□White 1988.

[40]Fanos 1995□Stanley 1996□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5000□□□□

[41]Farley 1991□Hunter et al.1993□43–4□Watts and El Katsha 1997□White 1988□□□□□□□□□20□□30—50□□□□□□□□□□□□□□□□□□□□□□□□□

[42]□□□□□□□□□□Burns 1990□Howell and Allan 1994□Hvidt 1995□Kishk 1986□Mageed 1994□Neuvy 1991□187□Stanley and Warne 1993□Waterbury 1979□□20□□□□□□□□□□□Said 1993□□□□□Ayeb 1996□□□□□□□

[43]White 1978□□□□□□□□□□□□□□□□□□□□□□□□46□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□,8 January 1998□A23□□

[44]□□□□□□□□□□□□□10%□12%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Ben Tuvia 1983□Por 1978,Por 1990□

[45]□□□□□□□□Sievert 1996□

[46]Bianchi 1989□462–4.

[47]1933□□□□□□□□□□□□□□□□□□□□□□□□Veneto□□□□□40□□□□□□□□□□□□□□□□□□□□□□Bevilacqua 1989□Clark 1984□127–30□□□□1939□□□□□□□□□□□□□□□□□□□□□□□□□Corona and Massullo 1989□375–426□□□Robertson 1938□

[48]□□□□□Bevilacqua 1989□

[49]Sievert 1996□89–90□□□□□□□□□□□□□□□□□□□□□□□

[50]De Rosa 1989.

[51]Bevilacqua 1989□298–301.

[52]□□□□□□□□□Sadkovich 1996□□□□□□□□□□□□□□□20□□30□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[53]Fontana 1981□138.

[54]□□□□□□□Corner 1975 on Ferrara□

[55]□□□□□□Graf 1985□Schwarz et al.1990□□Worster 1985□□□□□□——□□□□□□□White 1995□□□□□□□□□NRC 1989□

[56]□□□□□□□□□□□□□□□□□□□□□□□□1905□□□□□□□□□□□□□□□□□□□□□□□□□□□

[57]Postel 1992□□□□□□□□□Lowi 1993□□□□□□Waterbury 1979□□□□□□Grove 1985□

[58]Smil 1993□45.

[59]Gleick 1999□84–91.

[60]GEMS 1989□150.

[61]Meyer 1996□77.

[62]□□Neuvy 1991□187–9□Obeng 1977□□□□□□□□□Gleick 1993□170–224□□□□□□□Gleick 1999□78 and Gutman 1994□Adams 1992□22–3□□□□□□□□“□□□□□”□□□□□□□“□□□□□”□

[63]NRC 1992□169,194□□□□□□90%□□□□□□□□□□□□□□□Stanners and Bourdeau 1995□81–2□□

[64]Daniel 1977□Galat and Frazier 1995□Outwater 1996□128–30□Phillips 1994□Turner and Rabalais 1991.

[65]NRC 1992□177□□□□□□□□□□□□□□□□□□□□□65%□75%□Stanners and Bourdeau 1995□82□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Adams 1992□128–54□□□□□□□□

[66]De Jong 1987□83–5□Lambert 1971□Williams 1990a.

[67]Prince 1997□121□□□□□□□□□□□□□□American Notes□□

[68]Outwater 1996□126.

[69]Prince 1997□Williams 1990a□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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1200□□□□Outwater□□□□30□□□□□77□□□□□□□□□□□□□□□□□□□□□□□Outwater
1996□17–21,31–2□□□□□□Naiman et al.1986□

[70]□□□T.E.Dahl,Wetland Losses in the United States□1780s–1980s,Report to Congress,U.S.Department of Interior□□Gleick 1993□295–6□□□□□□□□6900□□□□□
□□□□□□□□□Vileisis 1997□

[71]ReVelle and ReVelle 1992□55.

[72]Richards 1990a□Richards and Flint 1990.

[73]J.F.Richards□□□□Gleick 1993□293□Zamora□□□□□□□Tolba and El-Kholy 1992□170□□□□□□□□□□□Ruddle 1987□

[74]Meyer 1996□72□Tolba and El-Kholy 1992□169–73.

[75]De Jong 1987□83–4□Tolba and El-Kholy 1992□112□van Lier 1991.

[76]Walker 1984.

[77]Postel et al.1996□“□□”□use□□“□□”□appropriation□□□□□□□□□□□□□□□□□
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# [illegible]6[illegible] [illegible]

[illegible]

——[illegible]Pliny the Elder[illegible]*Natural History*[illegible]

“[illegible]”[illegible]biosphere[illegible]·[illegible]Edward Seuss[illegible]20[illegible]——[illegible]Vladimir Ivanovich Vernadsky[illegible]1863—1945[illegible]Pierre Teilhard de Chardin[illegible]1881—1955[illegible]biota[illegible]

[illegible]35[illegible]400[illegible]400[illegible]50[illegible]3[illegible]4[illegible]coevolution[illegible]

[illegible]20[illegible]seafloor vent[illegible]“[illegible]”[illegible][1][illegible]

[illegible] 20 [illegible]

[illegible] 20 [illegible]

# [illegible]

[illegible] 20 [illegible] Homo sapiens [illegible] 1880 [illegible] 20 [illegible]

[illegible][2]

[illegible] 1880 [illegible][3] 1880 [illegible]·[illegible] Louis Pasteur [illegible] 1822—1895 [illegible]·[illegible] Robert Koch [illegible] 1843—1910 [illegible]

[illegible] 19 [illegible]

1880 1880—1960 [4]

1830 1850 4

1832 19 · 5 1831 1890 1920 [5]

19 1900

19 1500—1850 1850 [6]

[illegible]

[illegible]19[illegible]80[illegible]（transmission cycle）[illegible]1890[illegible][7]1898[illegible]1904[illegible]1900[illegible]1925[illegible][8]

[illegible]20[illegible]1908[illegible]（Rockefeller Institute）[illegible]（Sanitary Commission）[illegible]·[illegible]（John D.Rockefeller，1839—1937）[illegible]20[illegible]20[illegible]（United Fruit Company）[illegible]（Standard Oil）[illegible]1920—1923[illegible][9]

[illegible][10][illegible]20[illegible]1880[illegible]1904—1905[illegible][11][illegible]1905[illegible]

1940[illegible] [illegible]20[illegible]1940[illegible]2500[illegible]1877[illegible]J.F.Joubert[illegible][12][illegible][13]

[illegible]1928[illegible]·[illegible]Alexander Fleming[illegible]1881—1955[illegible]1929[illegible]penicillin[illegible]1940[illegible]·[illegible]Howard Florey[illegible]1898—1968[illegible]Peoria[illegible]1943[illegible]1990[illegible]2.5[illegible]

1897[illegible] [illegible]20[illegible]1721[illegible]19[illegible]80[illegible][14][illegible]1897[illegible]1915[illegible]1921[illegible]19[illegible]90[illegible]20[illegible]30[illegible]1923[illegible]20[illegible]30[illegible]1937[illegible]1945[illegible]1954[illegible]1962[illegible]1945—1963[illegible]

[illegible]1920—1990[illegible]20[illegible][15][illegible]

[illegible]/[illegible] [illegible]1915—1922[illegible][16][illegible]1919[illegible]1923[illegible]1930[illegible]“[illegible]”[illegible][17][illegible]20[illegible]70[illegible]

1880[illegible]1492[illegible]150[illegible]80%[illegible]90%[illegible]1880[illegible]1880[illegible]

[illegible]1948[illegible]·[illegible]George Marshall[illegible]1967[illegible]U.S.Surgeon General[illegible]“[illegible]”[illegible][18]

1948[illegible]10[illegible]5000[illegible]20[illegible]3[illegible]1977[illegible]1978[illegible]1980[illegible]Koltsovo[illegible][19][illegible]

1946[illegible] 1945[illegible]1946[illegible]20[illegible]70[illegible]multipledrug-resistant[illegible]MDR[illegible]

[illegible][20][illegible]20[illegible]50[illegible]20[illegible]90[illegible]1981[illegible]10[illegible]20[illegible]50[illegible][21]

[illegible]“[illegible]”[illegible]tragedy of the commons[illegible]

[illegible] [illegible]1977[illegible]1985[illegible]19[illegible]20[illegible]80[illegible]20[illegible]90[illegible]70%[illegible]1997[illegible]5000[illegible]human immunodeficiency virus[illegible]HIV[illegible]1985[illegible]HIV[illegible]1/4[illegible]1990[illegible]250[illegible]1995[illegible]300[illegible][22]

[illegible]1955[illegible]1992[illegible]DDT[illegible]1945[illegible]DDT[illegible]1977[illegible]1960[illegible]60[illegible]

□chloroquine□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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1995□□□□□□□□□□□58□□[27]□□□□□□□□□□□□□□□□□□□□□□□□□□□□
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[illegible]

[illegible][30] [illegible]20[illegible]

[illegible] 20[illegible]5[illegible]1990[illegible]4[illegible]5[illegible][31]

[illegible][32]1902[illegible]1934[illegible]1942[illegible]falciparum malaria[illegible]13[illegible]1944—1995[illegible][33]

[illegible] [illegible]1850[illegible]1910[illegible]1960[illegible]1930[illegible]Anopheles gambiae[illegible]16[illegible]2[illegible]1938—1939[illegible][34]20[illegible]20[illegible]1918—1919[illegible]3000[illegible]20[illegible]90[illegible]5[illegible][35][illegible][36][illegible]

[illegible] [illegible]19[illegible]20[illegible]

[illegible]1880—1930[illegible]rinderpest[illegible]tsetse fly[illegible]Glossina[illegible]trypanosomes[illegible]trypanosomiasis[illegible]

[illegible]1890[illegible]1890—1940[illegible][37]

[illegible]1900—1905[illegible]25[illegible]19[illegible]80[illegible]1925[illegible]20[illegible]80[illegible]1885[illegible]“[illegible]”[illegible]scramble for Africa[illegible][38]

[illegible]20[illegible]40[illegible]lassa fever[illegible]1969[illegible]

[illegible]Marburg virus[illegible]1967[illegible]1976[illegible]1997[illegible]230[illegible]1959[illegible]20[illegible]70[illegible]20[illegible]80[illegible]1998[illegible]4700[illegible]2/3[illegible]1978—1998[illegible]1400[illegible][39]

[illegible]1970[illegible]

[illegible]20[illegible]“[illegible]”[illegible]synanthrope[illegible]20[illegible]90[illegible]100[illegible]200[illegible]

[illegible]1/5[illegible]1950[illegible]1970[illegible][40]

[illegible]1918[illegible]“[illegible]”[illegible][41]

[illegible]1889[illegible]

19 90 … 90% … 2/3 … 20 …[42]

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1975 … 30 …[44]

… · … Edward Jenner … 1798 … “ … ”[45] 20 … 1980 …

20 …[46]

## [illegible]

[illegible]20[illegible]

20[illegible]20[illegible]1/3[illegible]domesticated plants[illegible]——[illegible]1900[illegible]35%[illegible]40%[illegible][47][illegible]1346—1352[illegible]

[illegible][48][illegible]30%[illegible]1.33[illegible]1/4[illegible]2600[illegible]3000[illegible]1/4[illegible]1900[illegible]1995[illegible]6.1[illegible][49]

[illegible]6.1 1990[illegible]

| | 土地覆盖类别（百万平方千米） | | | |
|---|---|---|---|---|
| 年份 | 森林与林地 | 草地 | 牧场 | 耕地 |
| 公元前 8000 | 65 | 63 | 0 | 0 |
| 1700 | 62 | 63 | 5 | 2.7 |
| … | … | … | … | … |
| 1850 | 60 | 60 | 8 | 5.4 |
| … | … | … | … | … |
| 1890 | 58 | 55 | 13 | 7.5 |
| 1900 | 58 | 54 | 14 | 8.0 |
| 1910 | 57 | 52 | 15 | 8.6 |
| 1920 | 57 | 51 | 16 | 9.1 |
| 1930 | 56 | 49 | 19 | 10.0 |
| 1940 | 44 | 47 | 21 | 10.8 |
| 1950 | 44 | 45 | 23 | 11.7 |
| 1960 | 53 | 41 | 27 | 12.8 |
| 1970 | 51 | 38 | 30 | 13.9 |
| 1980 | 51 | 35 | 33 | 15.0 |
| 1990 | 48 | 36 | 34 | 15.2 |

□□□□Graetz 1994□RIVM 1997□table A22□Richards 1990b□WRI 1996□WRI 1997

[illegible]

[illegible] [illegible]1700[illegible]2%[illegible]3%[illegible]

1700[illegible]1830[illegible]1930[illegible]1930[illegible]1700[illegible]4[illegible]1700—1930[illegible]

[illegible]20[illegible]20[illegible]30[illegible]Peace River[illegible]“[illegible]”[illegible]Virgin Lands[illegible]1954—1960[illegible]1960[illegible]

[illegible]5[illegible]1[illegible]1920[illegible]1930[illegible]1960[illegible]1966[illegible]“[illegible]”[illegible][50]

“[illegible]”[illegible]20[illegible]1950[illegible]1960[illegible]1970[illegible]——[illegible]1960[illegible][51][illegible]Igbo[illegible]

[illegible]20[illegible]80[illegible]1997[illegible]“[illegible]”[illegible]1/4[illegible]1972

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70%□90%□□□□□□□□□□□□□□□□[54]

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[illegible]1980[illegible]80[illegible][58]

[illegible]6.2 [illegible]1920—1990[illegible]

| | 数量（单位：百万） | | |
|---|---|---|---|
| 年份 | 美国 | 苏联 | 全球 |
| 1920 | 0.25 | 0 | 0.3 |
| 1930 | 1.0 | 0.05 | 1.1 |
| 1940 | 1.6 | 0.5 | 3 |
| 1950 | 3.4 | 0.6 | 6 |
| 1960 | 4.7 | 1.3 | 10 |
| 1970 | 4.6 | 2.0 | 16 |
| 1980 | 4.8 | 2.4 | 24 |
| 1990 | 4.6 | 2.7 | 26 |

[illegible]Stanton 1998[illegible]Vasey 1992[illegible]Volin 1970

[illegible]harvesting combine[illegible]20[illegible]20[illegible][59][illegible]monoculture[illegible][60][illegible]

[illegible][61][illegible]1920[illegible]1/4[illegible]

[illegible]1920[illegible]1990[illegible]2%[illegible]3%[illegible]20[illegible]40[illegible]20[illegible]80[illegible]30%[illegible]

[illegible]1890—1930[illegible]1935—1985[illegible]3[illegible]1940[illegible]1600[illegible]1968[illegible]1.1[illegible]1977[illegible]4[illegible]3[illegible][62]

[illegible]20[illegible]

[illegible]Green Revolution[illegible]20[illegible]40[illegible]60[illegible]70[illegible]dwarf wheat[illegible]20[illegible]

[illegible]Gregor Mendel[illegible]1822—1884[illegible]mathematical genetics[illegible]1900[illegible]19[illegible]80[illegible]1925[illegible]10[illegible]1935[illegible]1946[illegible]10[illegible]10[illegible][63]

[illegible]1876[illegible]1918[illegible]double-cross[illegible]1930[illegible]1%[illegible]10[illegible]1939[illegible]1/6[illegible]1950[illegible]3/4[illegible]1970[illegible]99%[illegible]20[illegible]3[illegible]4[illegible][64]

[illegible]20[illegible]20[illegible]·[illegible]Henry Wallace[illegible][65][illegible]“[illegible]”[illegible]1941—1943[illegible]·[illegible]Norman Borlaug[illegible]1914[illegible][66]1944[illegible]·[illegible]1953[illegible]10[illegible]

[illegible]1970[illegible]Hermosillo[illegible]U.S.Agency for International Development,AID[illegible]

[illegible]1963[illegible]1968[illegible]18[illegible][67]

1960[illegible]International Rice Research Institute[illegible]IRRI[illegible][68][illegible]20[illegible]20[illegible]60[illegible]1959[illegible]1959—1961[illegible]“[illegible]”[illegible][69]

[illegible][70][illegible]20[illegible]60[illegible]1949[illegible]

[illegible][71][illegible]20[illegible]60[illegible]70[illegible]

[illegible]1970[illegible]10%[illegible]15%[illegible]1983[illegible]1991[illegible]3/4[illegible][72]1990[illegible]95%[illegible]

[illegible]1960—1990[illegible]17[illegible]60%[illegible]90%[illegible]“[illegible]”[illegible]1680[illegible]70[illegible]90[illegible]1800—1950[illegible][73][illegible]1492[illegible]900[illegible]6.3[illegible]1960[illegible]

[illegible]6.3 93[illegible]1961—1992[illegible]

| | 单产量（公斤/公顷） | | | | |
|---|---|---|---|---|---|
| 作物 | 1961—1963 | 1969—1971 | 1979—1981 | 1990—1992 | 增长系数 1961—1992 |
| 小麦 | 868 | 1153 | 1637 | 2364 | 2.7 |
| 稻米 | 1818 | 2218 | 2653 | 3459 | 1.9 |
| 玉米 | 1157 | 1456 | 1958 | 2531 | 2.2 |

[illegible]WRI 1996[illegible]226

[illegible][74][illegible]1990[illegible]1985[illegible]100[illegible]2/3[illegible][75][illegible]5[illegible]

[illegible][76][illegible][77]

[illegible]“[illegible]”[illegible]Green Revolution kulaks[illegible][78]

[illegible]

[illegible]“[illegible]”[illegible]1950[illegible]7[illegible]1985[illegible]36[illegible]36[illegible]1981[illegible][79]

[illegible]1846[illegible]Corn Laws[illegible]1890—1940[illegible]

[illegible]20[illegible]30[illegible]1942[illegible]1947[illegible]20[illegible]80[illegible]1936[illegible]30%[illegible]1986[illegible][80][illegible]1945[illegible][81][illegible]20[illegible]60[illegible]1960[illegible]1965[illegible]genetic manipulation[illegible][82]

## [illegible]

1940[illegible]20[illegible]1996[illegible]prime farmland[illegible][83]

[illegible]20[illegible]

[illegible]20[illegible]

[illegible]“[illegible]”[illegible][84][illegible]

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[1][illegible]“[illegible]”[illegible]

[2][illegible]

[3][illegible]Mercer 1990[illegible]

[4][illegible]Hays 1998[illegible]

[5][illegible]20[illegible]10[illegible]1940[illegible]1960[illegible]

[6]Northrup 1995[illegible]120–4.

[7]Curtin 1989.

[8][illegible]19[illegible]Lyons 1992[illegible]Kunitz 1994[illegible]

[9]Jennings 1988[illegible]28–32[illegible]Ettling 1981[illegible]1916[illegible]Hewa 1992[illegible]Chomsky 1996[illegible]

[10]McNeill 1976[illegible]235–91[illegible]Cooter 1993[illegible]

[11][illegible]1907—1970[illegible]Miège 1989[illegible]211[illegible]

[12]Dobson and Carper 1996[illegible]

[13][illegible]Masai[illegible]

[14]Moulin 1992[illegible]

[15][illegible]RIVM/UNEP 1997[illegible]96[illegible]1920[illegible]1945[illegible]20[illegible]

[16][illegible]1917[illegible]Hutchinson 1985[illegible]

[17][illegible]Feshbach and Friendly 1992[illegible]37[illegible]Johnson 1988[illegible]Solomon[illegible]Hutchinson 1990[illegible]

[18]Bloom and Murray 1992[illegible]1055[illegible]1969[illegible]Porter 1997[illegible]491[illegible]Tenner 1996[illegible]58[illegible]Garrett 1994[illegible]33[illegible]1967[illegible]

[19][illegible]Fenner 1993 and Oldstone 1998[illegible]27–44[illegible]1958[illegible]1996[illegible]guinea worm disease[illegible]river blindness[illegible]

[20][illegible]The Economist,31 May 1997[illegible]73–4[illegible]

[21]20□□70□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□30□□□□Levy 1992□□□□□□□□□Ralph Gonzales□□□□□□□□□□□□□□Washington Post,17 September 1997□A2□□□□□1992□□□□□□□□□□□□□1/5□□□□□□□□□□□□□□□□

[22]Ewald 1994□65□Raviglione et al.1995□1995□□□20□□□□□□□□□□bacillus□□□□□□□1/3□□□Dobson and Carper 1996□□

[23]□□□□□□□□□□□Murray and Lopez 1996□□

[24]Epstein et al.1994.

[25]□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5□10□□□20□□60□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Society for General Microbiology 1995□Levy 1992□Garrett 1994□

[26]Garrett 1994□□□□□□□Murray and Lopez 1996□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[27]Feshbach and Friendly 1992 □ app.4□Population Reference Bureau,1996,World Population Data Sheet□Bridges and Bridges 1996□178□□□□□□□□

[28]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Bloom and Murray 1992□1059–60□□

[29]Lucas 1982□□□1949□□□□□□□□□□□□□□□□□Yip 1995□105–14□

[30]□□□□□□□□□□□□□□□□□□□□□□□□□□□□1987—1992□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[31]□□□□□□□□□□□□□□□□□□□□□□□□□□□Brinkmann 1994□304–6□□Brinkmann□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Kunitz 1994□11□

[32]□□Gallagher 1990□

[33]Ibid.34–5□Hunter et al.1993□43–4.

[34]Curtin 1993□346–7.

[35]Chen 1994□323.

[36]Shope and Evans 1993.

[37]Giblin 1992.

[38]Ford 1971□Lyons 1992□Hoppe 1997□Giblin 1990 and 1992□Maddox et al.1996□Headrick 1994□67–94□273–384□□□20□□20□□□□□□□□□□□□□□□□□□Congo-Océan railway□□□□□10%□30%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Headrick 1994□68□□Waller 1990□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[39]□□Morse 1993□□□□□□Murphy 1994□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□The Economist,4 July 1998□79□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Science News 153□85□□□□□□□□□□□□□□□□□□□□□□□The Economist,6 February 1999□86□□□

Beatrice Hahn[illegible]1920[illegible]1960[illegible]1945[illegible]1974[illegible]Lyme disease[illegible]150[illegible]Spielman 1994[illegible]19[illegible]

[40][illegible]Hantavirus[illegible]Argentine hemorrhagic fever[illegible]

[41]Beveridge 1993[illegible]Murphy and Nathanson 1994[illegible]

[42][illegible]Dobson and May 1986[illegible]Ford 1971[illegible]138–40[illegible]Iliffe 1995[illegible]208–11[illegible]Ranger 1992[illegible]Spinage 1962[illegible]

[43]20[illegible]Guayaquil[illegible]Pineo 1996[illegible]

[44][illegible]30[illegible]WHO 1996[illegible]

[45]Wills 1996[illegible]29[illegible]

[46][illegible]Cliff et al.1998[illegible]

[47]RIVM/UNEP 1997[illegible]75[illegible]Vitousek et al.1986.

[48][illegible]1980[illegible]Houghton 1994[illegible]

[49]Hannah et al.1994[illegible]20[illegible]90[illegible]27%[illegible]/[illegible]“[illegible]”[illegible]10[illegible]

[50]Ioffe and Nefedova 1997[illegible]71-5.

[51][illegible]Houghton 1994[illegible]1960[illegible]400[illegible]1970[illegible]100[illegible]600[illegible]1000[illegible]20[illegible]50[illegible]1940[illegible]

[52]Biswas 1994[illegible]8.4%[illegible]

[53][illegible]1945—1990[illegible]200[illegible]20[illegible]90[illegible]500[illegible]1000[illegible]Gardner 1997[illegible]49[illegible]Xu and Peel 1991[illegible]258[illegible]Smil 1993[illegible]57[illegible]1957—1990[illegible]1500[illegible]Douglas 1994[illegible]Biswas 1994[illegible]150[illegible]700[illegible]800[illegible]

[54][illegible]1900[illegible]1900[illegible]45%[illegible]1990[illegible]80%[illegible]Solbrig and Solbrig 1994[illegible]224[illegible]1900[illegible]Vasey 1992[illegible]

[55]Fitzgerald 1996[illegible]1929[illegible]

[56][illegible]Nielsen 1988[illegible]Walsh 1992[illegible]Gunst 1990[illegible]20[illegible]60[illegible]1970[illegible]

[57][illegible]Jedrej 1983[illegible]20[illegible]30[illegible]Manzanova and Tulokhonov 1994[illegible]Tam 1985[illegible]

□□□□□□□□□□Burrows and Shlomowitz 1992□

[58]□□□□□□□□Grigg 1992□49–51□□□□□□□Rasmussen 1982□Mannion 1995□95–104□

[59]□□□□□□□□□□□□50%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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[61]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Andreas Kruess and Teja Tscharntke,Science News,June 11,1994□375□□□

[62]Bairoch 1989□327□□□□□□□□□□□□19□□□3□□□□20□□□13□□□1985□□□□□□□□□1950□□□

[63]Hayami and Yamada 1991□Hayami 1975□□□□□□□□□□□□□□□□1912□□□□□□□□1932□□□1/4□□□□□□□□□□□□□□□□□□□□□□□70□□□□□□□□□□□□□□□□□Dalrymple 1974□10–11□□

[64]Mangelsdorf 1974□211–14□□□□□□□□□□□□“□□”□generation□□□□□□□□□□□□Fitzgerald 1990□

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[66]Jennings 1988□□□□□□□□□□□□□□□□□□□□□□□□□□□1940□□□□□□□Avila Camacho□□□□□□□□□□□□Lázaro Cárdenas□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Fitzgerald 1986□

[67]Lupton 1987□68–9.

[68]Anderson 1991.

[69]Dalrymple 1974□10–15,73–75.

[70]□□□□□□□1930□□□□□□□□□□□1947□□□□□□SR52□□1950□□□□□□□□□□□□□□□□□SR-52□□□□□□□□□50%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Jahnke et al.1987□□□Low 1985□□

[71]□□□1964□□□□480□U.S.Public Law 480□□□□□□□□□□□□□□□□□□□□□

[72]Tolba and El-Kholy 1992□296□WRI 1996□226.

[73]Bairoch 1989.

[74]1955—1988□□□□□□□□□4□□□Tolba and El-Kholy 1992□295□□□

[75]Ibid.p.296□□□Pimentel and Lehman 1993□

[76]□□□□1970□□□□□□□□□□□□□15%□□□□□□1971□□□□□□□□□□□□□□□genetic profile□□Mangelsdorf 1974□213□□

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[78][illegible]Shiva 1991b[illegible]Thandi 1994[illegible]Hazell and Ramasamy 1991[illegible]Alauddin and Tisdell 1991[illegible]Simonian 1995[illegible]170–72 and Sonnenfeld 1992[illegible]Sharma and Poleman 1993[illegible]David and Otsuka 1994[illegible]Bezuneh and MabbsZeno 1984[illegible]20[illegible]70[illegible]

[79]Bairoch 1989[illegible]346[illegible]

[80]Blaxter and Robertson 1995[illegible]

[81][illegible]Cochrane 1993[illegible]Hayami and Yamada 1991[illegible]1880—1985[illegible]100[illegible]16[illegible]4.4[illegible]Hayami and Yamada 1991[illegible]253–4[illegible]

[82][illegible]Burmeister 1990[illegible]Freeman 1993[illegible]

[83][illegible]Dennis Avery[illegible]The Economist,16 July 1996[illegible]23[illegible]

[84]Epistles 10[illegible]24[illegible]“Naturam expellas furca tamen usque recurret”.

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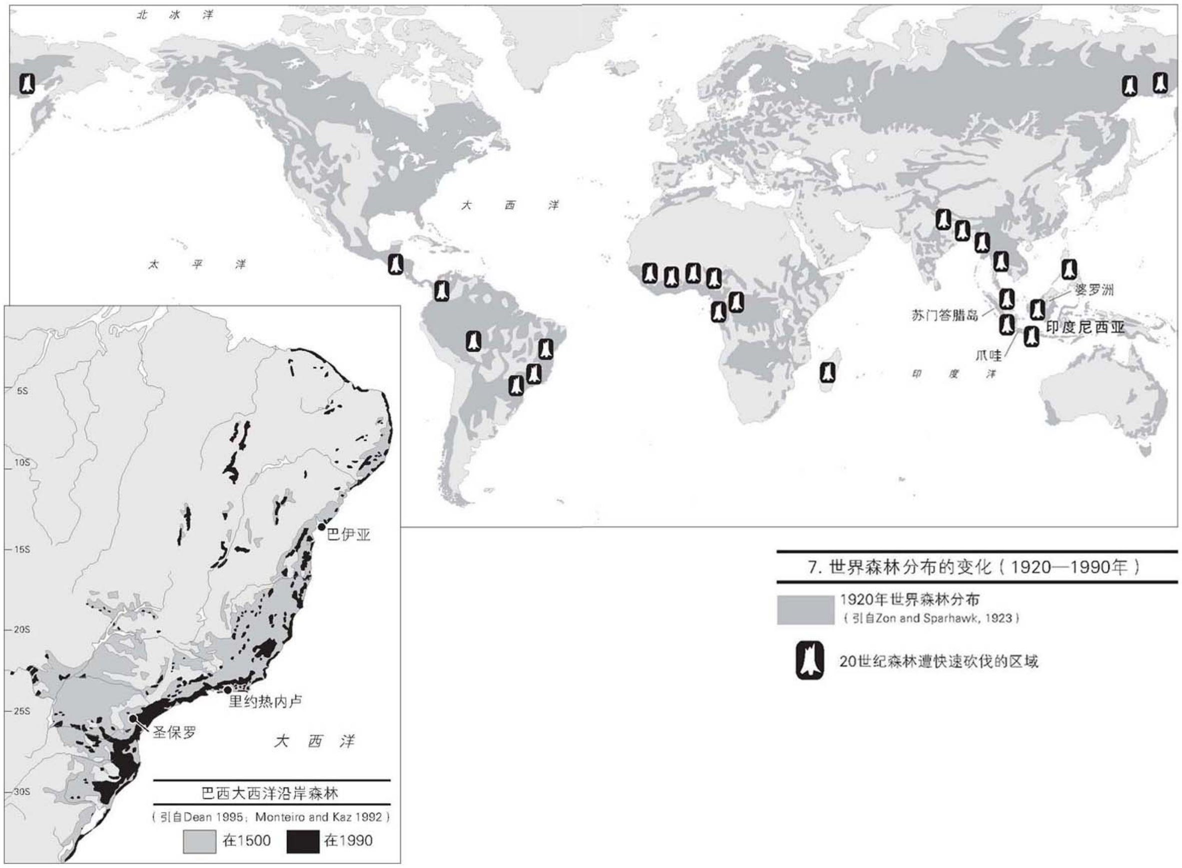
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7. 世界森林分布的变化（1920—1990年）

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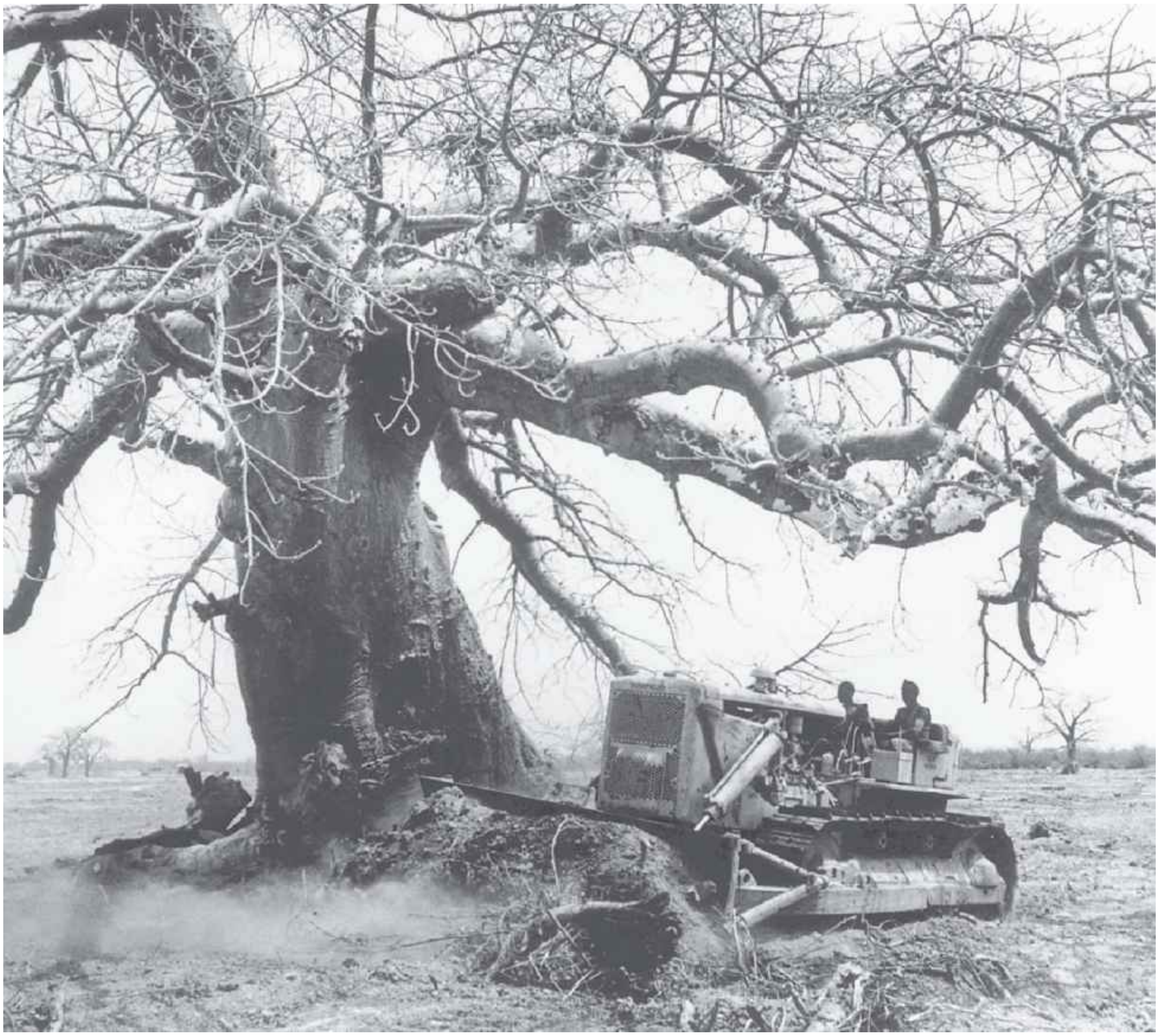
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[illegible]15[illegible]20[illegible]90[illegible]1/3[illegible]1960—1990[illegible][16][illegible]1/3[illegible]20[illegible]20[illegible]1980[illegible][17]



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1904[illegible][18][illegible]5000[illegible]19[illegible]1610—1840[illegible]Spitzbergen[illegible]bowhead whale[illegible][19][illegible]19[illegible]1820—1860[illegible]1860[illegible]sperm whale[illegible]right whale[illegible]1890[illegible]Aleut[illegible]Chukchi[illegible]1900[illegible]“[illegible]”[illegible][20][illegible]

[illegible]fin whale[illegible]sei whale[illegible]Bryde’s whale[illegible]minke whale[illegible]1900[illegible]100[illegible][21][illegible]

[illegible]1864—1868[illegible]·[illegible]Svend Fϕyn[illegible]1809—1894[illegible]harpoon cannon[illegible]·[illegible]Moby Dick[illegible]Ahab[illegible]“[illegible]”[illegible]

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[illegible]1903[illegible]1860[illegible]1904[illegible]20[illegible]1960[illegible]8[illegible]



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□□□□□□□□□□□□[22]□□□□□□□□□□□□□□□□□□□□□1903□□□□□□□□□□□□□□□□□□□□□□□□□□20□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□[23]

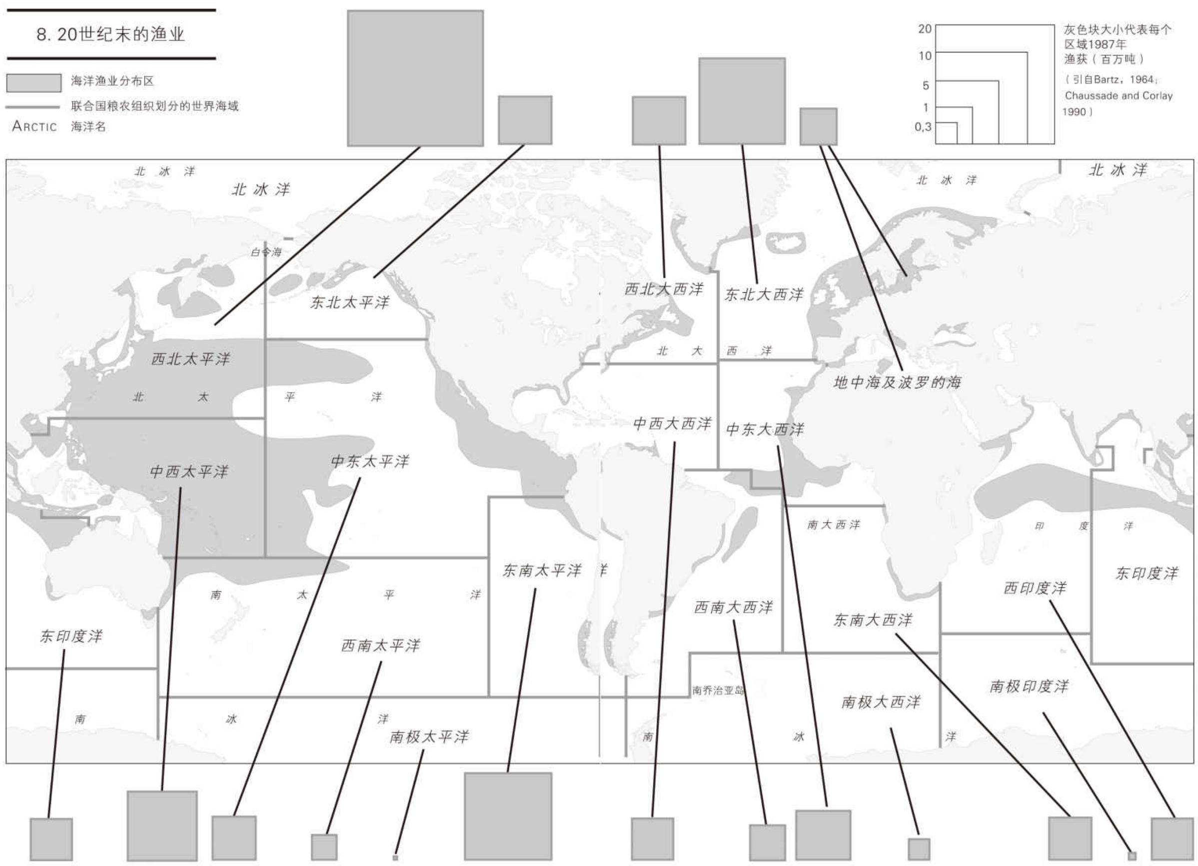
□□□□□□□1913—1938□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□50□□□□□□□□□□□□□□□□□□□□□□□□“□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1904□□□□□1900□□□□□15□□25□□□□□1989□□□□500□□□□□□□1900□□□□70□□□1982□□□□□□□□□7□□□□□1989□□□□2□□□□□□□□□□□□□□□□□□□□□□□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□[24]

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1950 [28] 20

[29]




1900 20

20 90 8% primary productivity

[30]

[31]

[illegible][32][illegible]10[illegible]7.1[illegible]3/4[illegible]by-catch[illegible]20[illegible]90[illegible]1/3[illegible]“[illegible]”[illegible]1/3[illegible]1/2[illegible][33][illegible]20[illegible]40[illegible]1973[illegible]20[illegible]50[illegible]60[illegible]80[illegible]19[illegible]20[illegible]30[illegible][34]

[illegible]20[illegible]20[illegible]80[illegible]90[illegible]“[illegible]”[illegible]

[illegible]7.1 [illegible]1800—1996[illegible]

| | 渔获量（百万吨） | | | |
|---|---|---|---|---|
| 年份 | 海洋 | 内陆 | 水产业 | 总和 |
| 1800 | ≈ 1 | | | |
| 1850 | ≈ 1.5 | | | |
| 1900 | ≈ 2.0 | | | |
| 1938 | ≈ 22 | | | |
| 1945 | ≈ 13 | ≈ 5 | | ≈ 18 |
| 1950 | ≈ 15 | | | |
| 1958 | ≈ 29 | | | |
| 1961—1963 | 33 | | | |

续表

| | 渔获量（百万吨） | | | |
|---|---|---|---|---|
| 年份 | 海洋 | 内陆 | 水产业 | 总和 |
| 1964—1966 | 40 | | | |
| 1967—1969 | 47 | | | |
| 1970—1972 | 51 | | | |
| 1973—1975 | 51 | | | |
| 1976—1978 | 54 | | | |
| 1979—1981 | 56 | | | |
| 1982—1984 | 60 | 6 | 7 | 73 |
| 1985—1987 | 68 | 6 | 9 | 83 |
| 1988—1990 | 71 | 6 | 12 | 89 |
| 1991—1993 | 68 | 6 | 15 | 89 |
| 1994—1996 | 74 | 7 | 21 | 102 |

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□□UNFAO 1997□4□□1950—1994□□□□□□□□□□1□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1950—1994□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□□□13□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1839□□□□□□□□□□□□□□□□□□□[35]□□20□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□20□□□□□20□□30□□□□□□□□□□□□□□□□□□1946□□1949□□□□70□□□□□□□□□□□□[36]□□1994□□□□□□20□□30□□□□□·□□□□□John Steinbeck□□□□□□□□□□□□□□□□□□□□□1945□□□□□□□1968□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[illegible][37][illegible]20[illegible][38]

[illegible]20[illegible]50[illegible]Humboldt Current[illegible]ancheveta[illegible]Chilean jack mackerel[illegible]1962[illegible]700[illegible]1967—1971[illegible]1000[illegible]1200[illegible]20%[illegible]1/3[illegible]1972[illegible]470[illegible]15[illegible]200[illegible]400[illegible]15%[illegible]20[illegible]70[illegible]80[illegible]

[illegible]1972[illegible]El Niño[illegible]150[illegible]1982—1983[illegible][39]

[illegible]20[illegible]70[illegible]1945[illegible]1971[illegible]80[illegible]

1971[illegible][40][illegible]1/4[illegible]

1970[illegible]20[illegible]90[illegible]2/3[illegible][41][illegible]20[illegible]90[illegible]900[illegible][42]

[illegible]1950—1971[illegible]

[illegible][43][illegible]20[illegible]70[illegible]200[illegible]exclusive economic zone[illegible]EEZ[illegible]“[illegible]”[illegible][44][illegible]1997[illegible]16[illegible]20[illegible]80[illegible]20[illegible]60[illegible]1990[illegible]1992[illegible]2.5[illegible]——1995[illegible]500[illegible]——[illegible]1970[illegible]1995[illegible][45][illegible]——[illegible]

[illegible]1980[illegible][46]1980[illegible]500[illegible]1996[illegible]2500[illegible]960—1279[illegible]1995[illegible]1988[illegible]80%[illegible]

[illegible]2/3[illegible][47][illegible]
[illegible]10[illegible]15[illegible]20[illegible]21[illegible]
[illegible][48]

## [illegible]

[illegible]20[illegible]bioinvasion[illegible][49][illegible]20[illegible]

[illegible]1492—1788[illegible]20[illegible]20[illegible][50]

[illegible]1850—1920[illegible]“[illegible]”[illegible]acclimatization society[illegible]1890—1891[illegible]80[illegible]starling[illegible][51][illegible]Hermann

Göring[illegible]Mosel[illegible]

[illegible][52][illegible]

[illegible]boll weevil[illegible]1890[illegible]20[illegible]30[illegible]Mobile[illegible]gypsy moth[illegible]1869[illegible]E.L.Trouvelot[illegible]1906—1991[illegible]1[illegible]20[illegible]90[illegible]1[illegible]1999[illegible]1230[illegible]500[illegible][53]

[illegible]“[illegible]”[illegible]ecological release[illegible]20[illegible][54]

[illegible] [illegible]Oryctolagus cuniculus[illegible][55][illegible]700[illegible]

[illegible]1859[illegible]·[illegible]Thomas Austin[illegible]Victoria[illegible]6[illegible]2[illegible]1870[illegible]wallaby[illegible]rat kangaroo[illegible]60[illegible]1859—1920[illegible]1902—1907[illegible]2100[illegible]“[illegible]”[illegible]1950[illegible]5[illegible]5000[illegible]myxomatosis[illegible]

[illegible]99.8%[illegible]

[illegible]20[illegible]90[illegible]1[illegible][56]

[illegible]1864[illegible]20[illegible]40[illegible]19[illegible]1945—1950[illegible]San Martin[illegible]15[illegible]20[illegible]5[illegible]

[illegible]Natal[illegible]1656[illegible]Robben Island[illegible]800[illegible][57]

[illegible] chestnut blight[illegible]1897[illegible]Progressive Era[illegible]·[illegible]Frank Meyer[illegible]1905—1918[illegible]2500[illegible]50[illegible]25%[illegible]“[illegible]”[illegible][58][illegible]Dutch elm disease[illegible]1927[illegible]1930[illegible]1900—1975[illegible]1/4[illegible]

[illegible] [illegible]20[illegible]1800[illegible]20[illegible]1889—1993[illegible]cheatgrass[illegible]19[illegible]70[illegible]tumbleweed[illegible]20[illegible]40[illegible]“[illegible]”[illegible]professor grass[illegible][59]

[illegible] [illegible]20[illegible][60][illegible]1850[illegible]250[illegible]140[illegible]1840[illegible]20[illegible]1974[illegible]Lake Kariba[illegible]Lake Tanganyika[illegible]“[illegible]”[illegible]aquatic chicken[illegible]tilapia[illegible]Tilapia mossambicus[illegible]niloticus[illegible]1952[illegible]20[illegible]80[illegible][61]

[illegible]Nile perch[illegible]20[illegible]50[illegible]200[illegible]cichlid[illegible]20[illegible]70[illegible][62]

[illegible]

[illegible]Erin Canal[illegible]1825[illegible]Welland Canal[illegible]1829[illegible]1825[illegible]139[illegible]1959[illegible]St.Lawrence Seaway[illegible]ballast water[illegible]sea lamprey[illegible]zebra mussel[illegible]

[illegible]1850[illegible]1920[illegible]30[illegible]1940—1960[illegible]90%[illegible]1956[illegible][63][illegible]1958[illegible]1970[illegible][64]

[illegible]1985[illegible]1986[illegible]1988[illegible]Lake St.Clair[illegible]1996[illegible]20[illegible]90[illegible]10[illegible][65]

[illegible]1979[illegible]1980[illegible]Mnemiopsis leidyi[illegible]1988[illegible]

[illegible]wet biomass[illegible]95%[illegible]2.5[illegible][66]

[illegible]20[illegible]80[illegible]

[illegible]19[illegible]80[illegible]“[illegible]”[illegible]Columbian exchange[illegible]1492[illegible]1930[illegible]1880[illegible][67]

[illegible]“[illegible]”[illegible]·[illegible]Thomas Jefferson[illegible]1743—1826[illegible]85%[illegible]1980[illegible]40[illegible]DDT[illegible]19[illegible][68]

[illegible]1976[illegible]56[illegible]2[illegible]prickly pear cactus[illegible]St.Johns wort[illegible]chrysolina beetle[illegible]20[illegible]20[illegible]1925[illegible]Cactoblastis cactorum[illegible]Klamath weed[illegible]1900[illegible]1944[illegible]200[illegible]1944[illegible]10[illegible]

1%[illegible][69]

[illegible]1993[illegible]16[illegible]1990[illegible]1970[illegible]cassava mite[illegible]10[illegible]Typhlodromalus aripo[illegible]1933[illegible]Benin[illegible]1/3[illegible][70]

[illegible]

[illegible]20[illegible]generalist[illegible][71][illegible]——[illegible]——[illegible][72][illegible]1958[illegible]·[illegible]Charles Elton[illegible]“[illegible]”[73]20[illegible]

## [illegible]

20[illegible]5[illegible]2.45[illegible]9/10[illegible]6500[illegible]

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□7.2 □□□□□□（1890—1990□□

| | 家畜（单位：百万） | | | | | |
|---|---|---|---|---|---|---|
| 年份 | 牛 | 绵羊 | 山羊 | 猪 | 马 | 家禽 |
| 1890 | 319 | 356 | 52 | 90 | 51 | 706 |
| 1910 | 391 | 418 | 83 | 115 | 73 | 828 |
| 1930 | 513 | 567 | 153 | 187 | 88 | 1203 |
| 1950 | 644 | 631 | 187 | 300 | 69 | 1372 |
| 1970 | 1016 | 1001 | 325 | 634 | 81 | 2734 |
| 1990 | 1294 | 1216 | 587 | 856 | 61 | 10770 |
| 1890—1990 年增长率 | | | | | | |
| | 406% | 342% | 1129% | 951% | 119% | 1525% |

[illegible]RIVM 1997[illegible]95

# [illegible]

[illegible]*Theses on Feuerbach*[illegible]20[illegible]20[illegible]

[illegible]20[illegible]clearcut[illegible]Dayak[illegible]

[illegible]

[illegible]

[illegible]20[illegible]20[illegible]

[illegible]1820[illegible]20[illegible]cyanobacteria[illegible]metabolic path[illegible]1/1000000000[illegible]1/5[illegible]

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[1][illegible]“[illegible]”[illegible]

[2]Meyer 1996[illegible]61[illegible]15%[illegible]Williams 1994[illegible]106[illegible]17.6%[illegible]WRI 1997[illegible]46%[illegible]7.1[illegible]26%[illegible]Mather 1990 and Williams 1994[illegible]Williams 1990c[illegible]Richards 1990b[illegible]

[3]WRI 1997[illegible]1960—1990[illegible]4.5[illegible]7.1[illegible]2/3[illegible]20[illegible]17[illegible]10[illegible]Williams 1990c,1994[illegible]90[illegible]E.Matthews.Richards 1990b[illegible]164[illegible]1700—1980[illegible]12[illegible]

[4]Msyhrt 1990[illegible]45.

[5][illegible]20[illegible]80[illegible]2/3[illegible]Westoby 1989[illegible]153[illegible]1960[illegible]10[illegible]1992[illegible]18[illegible]FAOSTAT[illegible]1997[illegible]9[illegible]22[illegible]Planhol 1969[illegible]

[6][illegible]1950[illegible]Mac-Cleery 1994[illegible]1960[illegible]Mather 1990[illegible]Lower 1973[illegible]MacCleery 1994[illegible]Marchak 1995[illegible]Williams 1988,1990c[illegible]20[illegible]80[illegible]1%[illegible]

[7]Quoted in Dean 1995[illegible]245.

[8]Dean 1995[illegible]McNeill 1988[illegible]Houghton et al.1991[illegible]

[9]Totman 1989.

[10]Cox 1988[illegible]Marchak 1995[illegible]117–42.

[11]Brookfield et al.1990[illegible]Feeny 1988.

[12][illegible]

[13]□□□□□□□Durand 1993□Peluso 1992□Potter 1996□

[14]Potter 1996□□□11%□□□□□□□□□□□□□□

[15]Marchak 1995 □ 237–68□Brookfield et al.1990□Westoby 1989 □ 133–8□Potter 1996□Dauvergne 1997.

[16]WRI 1996□201□NRC 1993b□34–5□□□20□□80□□□□□□8%□

[17]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Bob Hasan□□□□□□□□□□□□□□□□□□□□□□Bresnan 1993□267□□□□□□□□□□□□□□□□□Kummer 1991□

[18]□□□□□□□□□□Ellis 1991□Kock 1995□□T.nnessen and Johnsen 1982□□□□□□□□□□Knox 1994□□□

[19]Hilborn 1990□375–6□□□□□□□□□□1000□□□□□□□□□□

[20]Hilborn 1990□378□□□□□□□□□National Research Council 1996□187–88□

[21]□□□□□□□60□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[22]□□□□□□□□□□□□□□□□□1947□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□80□□□“□□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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[24]Kock 1995 □ 28□Knox 1994 □ 343–6□Payne 1995 □ 269□Tonnessen and Johnsen 1982□751□□□□□□□□□□□□□□□□International Whaling Commission□□

[25]Payne 1995□298–99□1959—1961□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Kock 1995□29□1949—1980□□□□□□□□□4.6□□□□□8000□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[26]20□□50□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□flags of convenience□□□□□□□□□□□Ellis 1991□431–3□To/nnessen and Johnsen 1982□534–8□□

[27]Kock 1995□19–23□Gambell 1993□Stoett 1997□□□□□□□□□□□□□□□□□□□□□□□□Kalland and Moeran 1992□93□

[28]□□□□□□□□□□Knox 1994□349–55□Knox□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Knox□□□□□□□□□□□□□□□□□□□1972□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Hodgson and Johnston 1997□

[29]Knox 1994□345–6.

[30]Pauly and Christensen 1995.

[31]Caddy 1993□□□□□□□□□□□□□□□□□

[32]Rothschild 1996□□□□□□□□□□□□□□□Caddy and Gulland 1983□

[33]□□□□□□□The Economist,19 March 1994□24□□□□□□□□30%□50%□□□□□□□□□□□Speer et al.1997□5-7□

[34]□□□□□□□□□□□□□□□□□20□□30□□□□□□□□□□□□□7.4□□□□□□□□□□□□□□□Hilborn□□□□1800□□□□100□□□□□□□□□□□□□28□□□□□□□20□□□□□□□□□□□1800□□□□□□□□□□□□1450□□□□

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[35]Graham 1956□497.

[36]Yamamoto and Imanishi 1992.

[37]20□□90□□□□□□□□□1968□□□□□□1/4□□□□□□□□□□□□□□□□□10%□WRI 1997□297□□

[38]□□□□□□□□□□□□Carré1982□Glantz 1992□Hilborn 1990□McEvoy 1986□Speer et al.1997□UNFAO 1997□

[39]Caviedes and Fik 1992□1998□□□□□□□□□□□□□□□□□□□□□50%□75%□

[40]□□□□□□□□□□□□□□□□□□□□1992□□□□□□□□□□□□□□□□□□□□□□□□□50□70□□□□□□□□□40□□□□□□□□□□

[41]UNFAO 1997□36,65□□□□□□□□□□□□□□□□□□□□□□□□□□□1991□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20%□40%□□□□□Elmgren 1989□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1982□□□□□□□□□□□5□□□

[42]Paul 1987□UNFAO 1997□Troadec 1989.

[43]Ludwig et al.1993□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[44]□1965—1980□□□□□□□□□□□□50□□□0□Sparks 1984□□

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[46]□□□2500□□□□□□Landau 1992□4□□

[47]1982□□□□□□□□□□□□□□□□□□□□□□□Gujja and Finger-Stich 1996□□□□□□□□□□Nakahara 1992□Liao and Shyu 1992□

[48]□□□□□□Landau 1992□UNFAO 1997□11–13□

[49]□□□□□□□□□Elton 1958□Groves and Burdon 1986□Williamson 1996□

[50]Burney 1996□□□□□□□10%□□□□□□□□□10%□□□□□□□□□economically significant□□□□Williamson 1996□□

[51]Tenner 1996□119–21□□□□□Eugene Schieffelin□□□□□□□□□Williamson 1996□46–7□□□□40□□□□□□□□□□□□Elton 1958□22–4□□□□□Long 1981□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□60□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[52]Druett 1983□95□□□□□muskrat□□□□□□□□□□1905□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1952□□□□□□□□□□□□□□□□Williamson 1996□89–92□De Vos et al 1956□□□

[53]□□□□USOTA 1993□□□□□□□□□□□Washington Post,3 February 1999□A15□□□□□□□□□Tenner 1996□110–3□□Conniff 1990□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□40□□□□□□□□□□□□□□□□□□1978□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[54]Di Castri 1989□□□□□□□□□□□□□□□Sykora 1990□Thellung 1915□

[55]Thompson and King 1994□De Vos et al.1956□Jaksic and Fuentes 1991□□□□□□□

[56]Myers 1986.

[57]□63□□□□□□□□□□2□□□□□Rattus rattus□□□R.norvegicus□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Mus musculus□□□□□□□□□□□□□□□□□□□□□Michaux et al.1990□

[58]Anagnostakis and Hillman 1992□Elton 1958□21–4□□□□□J.L.Harper in von□□□□□Broembsen 1989□□□□□□□□□□□Karnosky 1979□

[59]Mack 1986,1989□Manning 1995□169–90.

[60]Ashton and Mitchell 1989□114.

[61]Sreenivasan 1991□Fernando and Holcik 1991.

[62]Dennis 1996□178–9□Ogutu-Ohwayo 1990□Williamson 1996□124–5□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[63]□□□□□□□□□□□□□□□□□Illinois Department of Energy and Natural Resources 1994,3□159–60□□□1965□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[64]Mills et al.1993□Regier and Goodier 1992□1980□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Illinois Department of Energy and Natural Resources 1994,3□165–6□□

[65]Mills et al.1993□USOTA 1993□Washington Post,14 May 1997□H1□□□□□□□□□□American Zoologist□1996□6□□□□□□□□□Ludyansky et al.□□□1981□□□□□□□□□□□□□□□□□□□□□□□□100□□200□□□□□□□□□□1890□□□□□□□□□□□□□□□□□□□□□□□500□□□□□□□□□□□□□□□Simberloff 1996□□

[66]Carlton 1996□Travis 1993.

[67]Carlton 1985,1989,1996□Carlton and Geller 1993□□□□□□□19□□40□□□□80□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[68]King 1984□□□□□□□□□Busch et al.1995□92□□□□

[69]Dahlsten 1989□Groves and Burdon 1986□Williamson 1996□120–4□van den Bosch et al.1982□21–35□□□□□□□□□□□□□□□□□□1996—1997□□□□□□□□□□□□□□□□□□□□□

[70]Washington Post,19 May 1997□A3□Biocontrol News and Information,June 1998□□□http□//pest.cabweb.org□81/MEMBER/bni/bni19-2/gennews.htm□

[71]□□□□□□□□□□□□□Drake et al.1989□

[72]□□□□□□□□□□□□□□□10%□18%□□□□□□□□□□□□59%□Sykora 1990□Vitousek et al.1996□□

[73]Elton 1958□31.

[74]□□□□□□□□Heywood and Watson 1995□□□□□□□□300□□1□□□□□175□□□□□□□□□□“□□”□

[75]Heywood and Watson 1995[illegible]233–4[illegible]May et al.1995[illegible]13.

[76][illegible]1850[illegible]passenger pigeon[illegible]1900[illegible]Martha[illegible]1914[illegible]50[illegible]Redford 1992[illegible]2000[illegible]400[illegible]

[77]Heywood and Watson 1995[illegible]Janetos 1997[illegible]Kaufman and Mallory 1993[illegible]Lawton and May 1995[illegible]Leakey and Lewin 1995[illegible]Wilson 1992[illegible]

[78][illegible]Heywood and Watson 1995[illegible]717–8[illegible]

[79]1997[illegible]2800[illegible]Washington Post,4 October 1997[illegible]

# [illegible]

[illegible]

——[illegible]·[illegible]José Martí[illegible]1975[illegible]23[illegible]44–5

19[illegible]20[illegible]20[illegible]20[illegible]

[illegible]

[illegible]20[illegible]

[illegible]8[illegible]9[illegible]10[illegible]

# [illegible]8[illegible] [illegible]

[illegible]

——[illegible]·[illegible]·[illegible]Marcus Terentius Varro[illegible]*De Re Rustica*[illegible]

20[illegible]20[illegible]20[illegible]40[illegible]

## [illegible]

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20[illegible]500[illegible]15[illegible]

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□8.1 □□□□□□□1750—1996□□

| | 百万人 | | | | | |
|---|---|---|---|---|---|---|
| 地区 | 1750 | 1800 | 1850 | 1900 | 1950 | 1996 |
| 亚洲 | 480 | 602 | 749 | 937 | 1386 | 3501 |
| 欧洲 | 140 | 187 | 266 | 401 | 576 | 728 |
| 非洲 | 95 | 90 | 95 | 120 | 206 | 732 |
| 北美 | 1 | 6 | 26 | 81 | 167 | 295 |
| 中南美 | 11 | 19 | 33 | 63 | 162 | 486 |
| 大洋洲 | 2 | 2 | 2 | 6 | 13 | 29 |

[illegible]Reinhard et al.1968[illegible]680–1[illegible]Population Reference Bureau[illegible]1996[illegible]

[illegible]1900[illegible]McEvedy and Jones 1978[illegible]

[illegible]1850—1950[illegible]1950[illegible]1950[illegible][3]

[illegible]20[illegible]90[illegible]0.1%[illegible]5%[illegible][4][illegible]

[illegible]1890—1990[illegible]3.5[illegible]17[illegible][5][illegible][6][illegible]1/5[illegible]13[illegible]1/4[illegible]31%[illegible]OECD[illegible]41%[illegible]successor state[illegible]2%[illegible]1%[illegible][7][illegible]

[illegible]20[illegible]1900—1970[illegible]1970[illegible]10[illegible]20[illegible]50[illegible]60[illegible]

[illegible]1970[illegible][8]

[illegible]1890—1970[illegible]1960[illegible]1960—1990[illegible]1930—1960[illegible]

20[illegible]——[illegible]——[illegible][9]

[illegible]4[illegible]5[illegible]44%[illegible]1900[illegible]1990[illegible]9[illegible]4[illegible]4/9[illegible]4[illegible]1980[illegible][10]

[illegible]20[illegible]20[illegible]

[illegible]

[illegible]19[illegible]20[illegible]90[illegible]1900—1940[illegible][11][illegible]meta-analysis[illegible]

[illegible]

[illegible]quantitative analysis[illegible][12]

[illegible]

[illegible]20[illegible]1960[illegible][13]

## [illegible]

[illegible]1500[illegible]1870[illegible]“[illegible]”[illegible]coolies[illegible]1845—1920[illegible]1925[illegible]1960[illegible]

[illegible][14][illegible]

[illegible]1870[illegible]20[illegible]

[illegible]1830—1920[illegible]5500[illegible]7000[illegible][15][illegible]1934[illegible][16][illegible]1924[illegible]1926[illegible]1929[illegible]1913[illegible]1834—1937[illegible]3000[illegible]4500[illegible]1914[illegible]“[illegible]”[illegible][17]

[illegible]1920[illegible]1500—1870[illegible]1913[illegible]bantustan[illegible]1949[illegible]1960[illegible]“[illegible]”[illegible]

[illegible]16[illegible]1917[illegible]300[illegible]400[illegible]

[18] 1917—
1922
1929
200 300 Urals
1927—1953 1000
“ ” “ ” 1941
1944 100 Kalmyk

1953
100 6
[19]

“ ” transmigration
[20]

1905 18
[21] 1905
3700 3000
1941 20
1941 3.6
1942—1945 1949
200 1987 5000

[illegible]5[illegible]

[illegible]1987[illegible]460[illegible]20[illegible]70[illegible][22][illegible]imperata[illegible]20%[illegible]20[illegible]80[illegible][23][illegible]

20[illegible]Sahelian[illegible][24]

[illegible]20[illegible]

## [illegible]

20[illegible]

[illegible]90%[illegible]95%[illegible]1700[illegible]5[illegible]50[illegible]1800[illegible]6[illegible]1650[illegible]6000[illegible]1750[illegible][25][illegible]19[illegible]80[illegible]20[illegible]20[illegible][26]8000[illegible]

[illegible]1900[illegible]43[illegible]50[illegible]1990[illegible]800[illegible]50[illegible]270[illegible]100[illegible]14[illegible]1000[illegible][27]

[illegible]17[illegible]1/10[illegible]1850[illegible]1920[illegible]1935[illegible]1960[illegible]1975[illegible]1985[illegible]1988[illegible][28][illegible]19[illegible]20[illegible]20[illegible]1960[illegible]20[illegible]30[illegible]20[illegible]80[illegible]20[illegible]70[illegible]8.2[illegible]20[illegible]3[illegible]1900[illegible]2.25[illegible]1998[illegible]28[illegible]13[illegible]

□8.2 □□□□□1890—1990□□

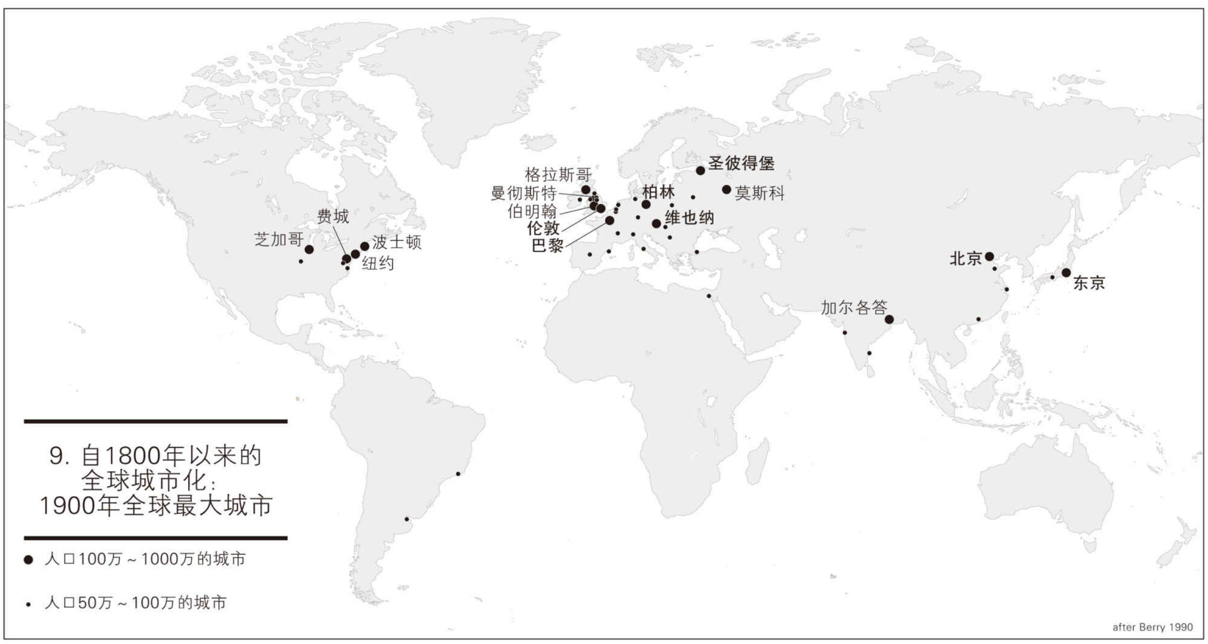
| | 占全球人口比重（%） | | | | | |
|---|---|---|---|---|---|---|
| 地区 | 1890 | 1910 | 1930 | 1950 | 1970 | 1990 |
| 美国 | 35 | 46 | 56 | 64 | 70 | 75 |
| 日本 | 30 | 40 | 48 | 56 | 71 | 77 |
| 西欧 | 35 | 45 | 55 | 63 | 72 | 78 |
| 拉美 | 5 | 7 | 17 | 41 | 57 | 71 |
| 苏联 | 12 | 14 | 18 | 39 | 57 | 66 |
| 非洲 | 5 | 5 | 7 | 15 | 23 | 34 |
| 中国 | 5 | 5 | 6 | 11 | 17 | 33 |
| 南亚 | 5 | 8 | 12 | 16 | 21 | 28 |
| 全球 | 14 | 18 | 23 | 29 | 37 | 43 |

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9. 自1800年以来的全球城市化：1800年全球最大城市




9. 自1800年以来的全球城市化：1900年全球最大城市




[illegible] urban metabolism [illegible][29]

[illegible] 1900 [illegible] 1990 [illegible] 8 [illegible][30] [illegible] 4 [illegible] 5 [illegible] 20 [illegible] 20 [illegible]·[illegible] Jaime Lerner [illegible] Curitiba [illegible]

[illegible] 19 [illegible]——[illegible]——[illegible][31] [illegible] 1870 [illegible]

[illegible]20[illegible]20[illegible]1950[illegible]3000[illegible]20[illegible]90[illegible]1/4[illegible]Maputo[illegible]220[illegible]Surat[illegible]20[illegible]90[illegible]1/5[illegible]1994[illegible]bubonic plague[illegible]56[illegible]1997[illegible][32][illegible]20[illegible]

[illegible]Staten Island[illegible]1948[illegible]20[illegible]90[illegible]20[illegible]90[illegible][33]

[illegible]1940[illegible]1970[illegible]“[illegible]”[illegible]

[illegible]1870—1920[illegible]20[illegible]90[illegible]1950[illegible][34][illegible]20[illegible]

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□□□□□□ 1900□□□□□□□□□□□□0.1%□□□1990□□□1%□[36]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□[37]

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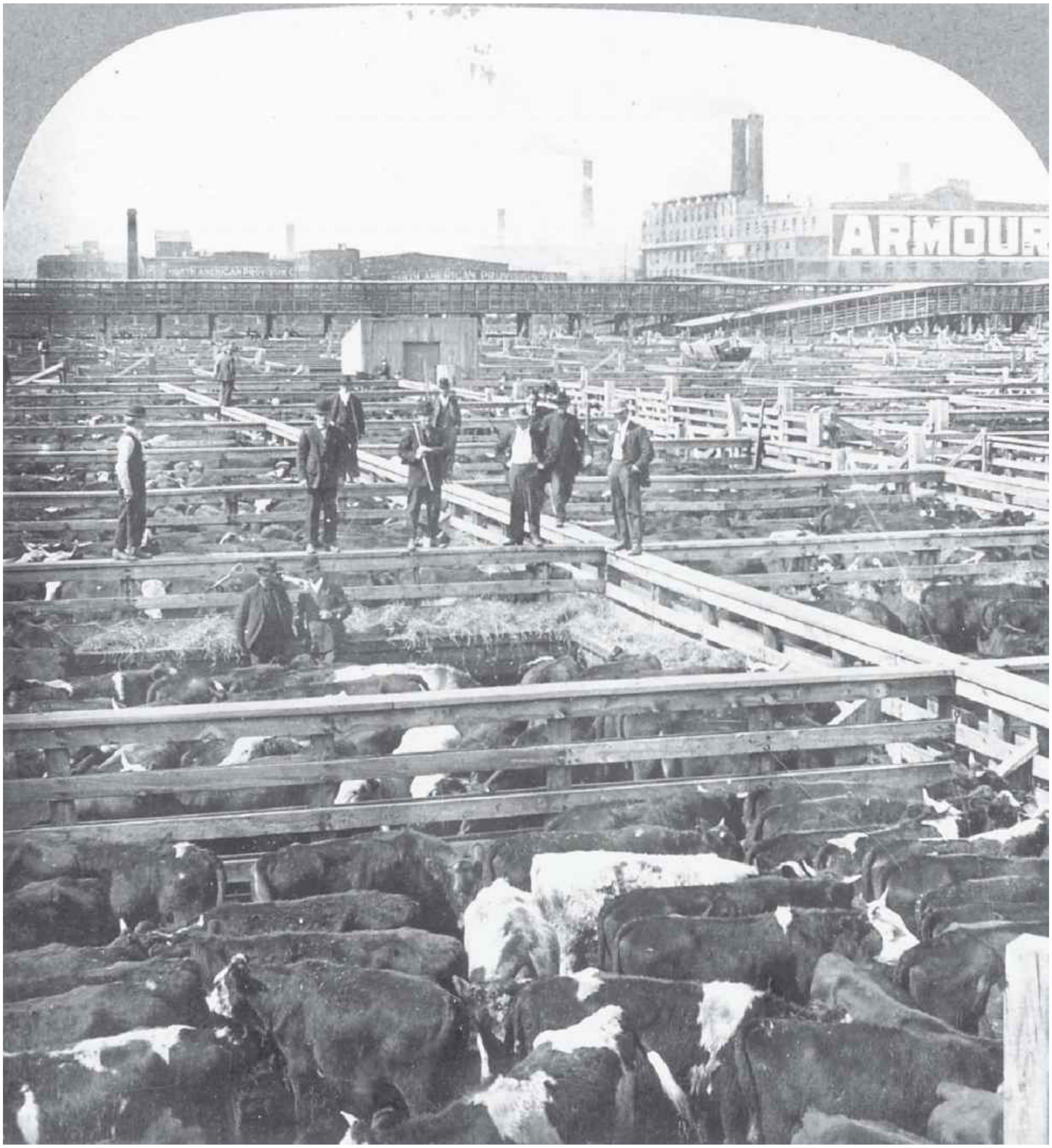
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| 11.7 | 汽油 | 0 |
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| 0 | 污水渣滓 | 6.3 |
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| 0.53（8827 人）[a] | 人 | 0.52（8632 人）[a] |

[illegible]Boyden et al.1981[illegible]116–7

[illegible]a[illegible]Boyden[illegible]60[illegible]

[illegible]1850[illegible][44]1990[illegible]1900[illegible]30[illegible]35[illegible]1900[illegible]1940—1985[illegible]7[illegible]1960[illegible]

[illegible][45]




[illegible]1909[illegible]1865[illegible]1900[illegible]·[illegible]Philip Armour[illegible]

[illegible]1900[illegible]1916[illegible]·[illegible]Carl Sandburg[illegible]“[illegible]”[illegible]1500[illegible]2000[illegible]20[illegible]80[illegible]700[illegible]1990[illegible]20[illegible]1960[illegible][46]

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[1][illegible]30‰[illegible]35‰[illegible]10‰[illegible]12‰[illegible]

[2]Boulding 1964[illegible]135–6[illegible]1910—1993[illegible]

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[4]Turco 1997□105□□□□□□□□□□□4:1□

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[8]Lee and Feng 1999□□□□□□□□□□□□□□□1978□□□□□□□□□□1998□□□□□□□□□□□□□□□2.5□□□20□□60□□□□□□□□□□3%□□70□□□□2%□□□1996□□□□□□□□□□□1.1%□Smil 1993□□□□□□□□□□□□□□□

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[12]Palloni 1994□160.

[13]Repetto and Holmes 1983□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□70□□□□□□Myers 1993□□□□□□□“□□□□□□□□”□□□□

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[15]Baines 1995□Thumerelle 1996□106–7.

[16]Klein 1995□211.

[17]Zolberg 1997□288.

[18]Treadgold 1957□159–61□Chesnais 1995□221□1801—1914□□□□□□□□□□□□□□□□□□□□□□□□□580□□□□□80%□□□□20%□□□□□□

[19]□□□□□□Polyakov and Ushkalov 1995□Zemskov 1991□□□□□1930—1931□□□□180□□□□□□Andreev-Khomiakov 1997□27–38□20□□30□□□□□□□□□□□□□□□□□□□□□□

[20]□Geertz 1963□

[21]Knapen 1998.

[22][illegible]10[illegible]30[illegible]

[23]Abdoellah 1996[illegible]Hardjono 1977,1988[illegible]Levang and Sevin 1989 [illegible] Rich 1994[illegible]34–8[illegible]

[24][illegible]7[illegible]Cordell et al.1996[illegible]

[25]Macfarlane 1997[illegible]22.

[26][illegible]Hohenberg and Lees 1985[illegible]259[illegible]Munch 1993[illegible]Lee and Feng 1999[illegible]Hanley 1987[illegible]20[illegible]80[illegible]20[illegible]

[27]Berry 1990[illegible]104–6[illegible]WRI 1997[illegible]8–9.

[28][illegible]Clark 1998[illegible]1996[illegible]

[29]Berry 1990[illegible]Douglas 1994[illegible]Gugler 1996[illegible]

[30]WRI 1997[illegible]152–3[illegible]1980—1995[illegible]

[31]Hanley 1987[illegible]17[illegible]

[32][illegible]WRI 1997[illegible]42–3[illegible]

[33][illegible]1994[illegible]25[illegible]Trefil 1994[illegible]23[illegible]Basu 1992[illegible]Melosi 1981[illegible]

[34]Abreu 1988[illegible]106,125–6[illegible]Pineo and Baer 1998[illegible]

[35]Hardoy et al.1993[illegible]1990[illegible]

[36]Douglas 1994[illegible]1990[illegible]1900[illegible]1/3[illegible]1/4[illegible]1900[illegible]1990[illegible]

[37][illegible]Rees 1992[illegible]

[38][illegible]The Wall Street Journal,4 March 1993[illegible]20[illegible]50[illegible]21%[illegible]1993[illegible]2%[illegible]TürkiyeÇevre Sorunlarl Vakfl1991[illegible]50[illegible]

[39]1990[illegible]7.2[illegible]Konvitz 1985[illegible]139[illegible]Ausubel and Herman 1988[illegible]Gugler 1996[illegible]Hurley 1997[illegible]Melosi 1990[illegible]1993[illegible]Platt 1991[illegible]Relph 1987[illegible]St.Clair 1986[illegible]Vance 1990[illegible]Whitehand 1987[illegible]1992[illegible]Pineo and Baer 1998[illegible]

[40][illegible]Ho 1997 and Yeoh 1993[illegible]Duus 1995[illegible]Abreu 1988[illegible]Coward 1988[illegible]Kosambi 1986[illegible]Low and Yip 1984[illegible]

[41]Jackson 1985.

[42]Hardoy et al.1993[illegible]115.

[43]Boyden et al.1981[illegible]Sit 1995[illegible]

[44]NRC 1992[illegible]22[illegible]1990[illegible]45%[illegible]2[illegible]

[45]□□□□□□□□□□Ezcurra and Mazari-Hiriart 1996□Pick and Butler 1997□□WRI 1997□64–5□Simon 1997□60–90□□□□□□□Romero Lankao 1999□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Omrane 1991□□□□□□□□□□□□□□□□□□Vennetier 1988□

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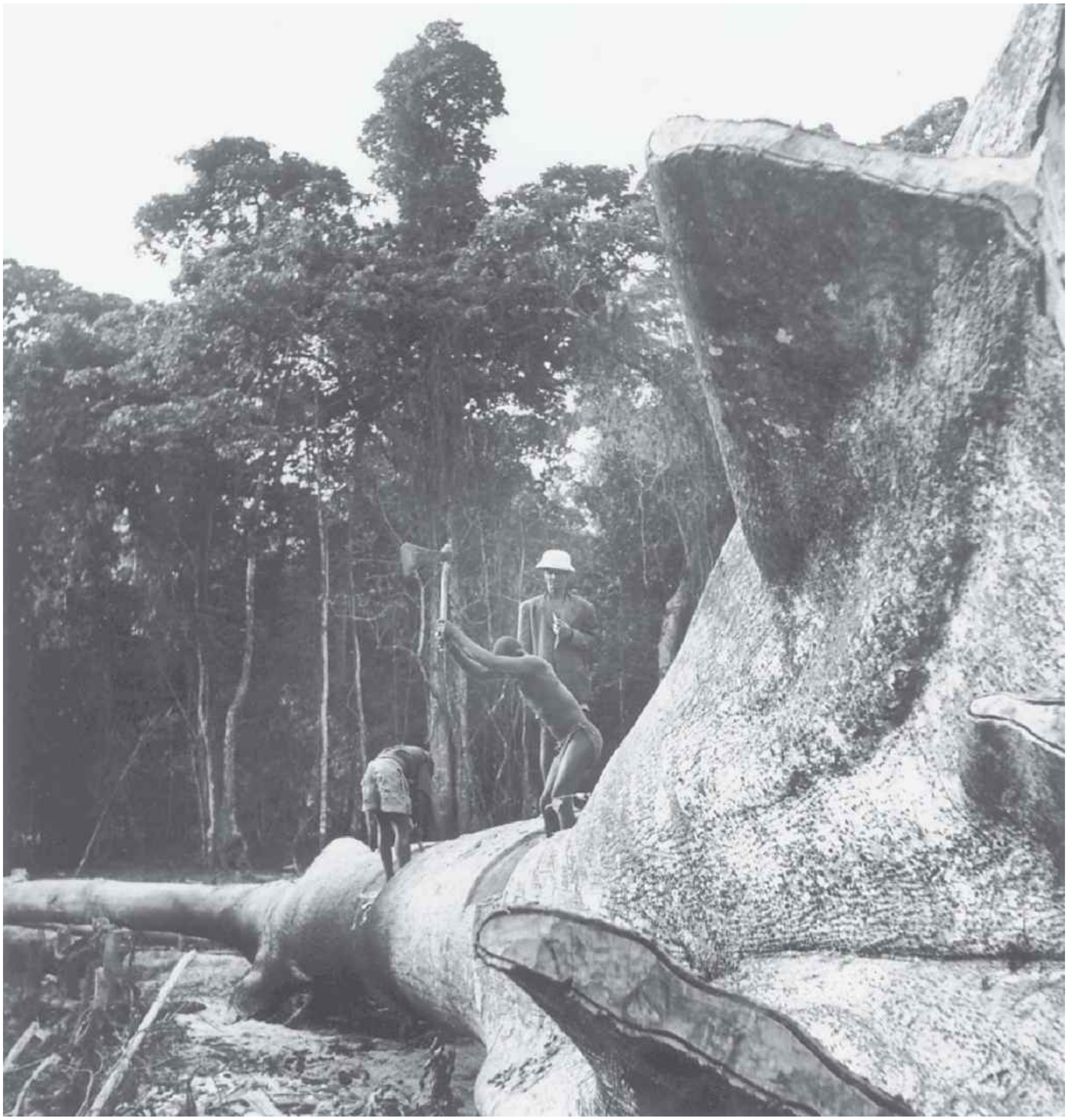
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[illegible]1957[illegible]Windscale[illegible]1986[illegible]31[illegible]80[illegible]13.5[illegible]9000[illegible]curie[illegible]2.4[illegible]20[illegible][26]

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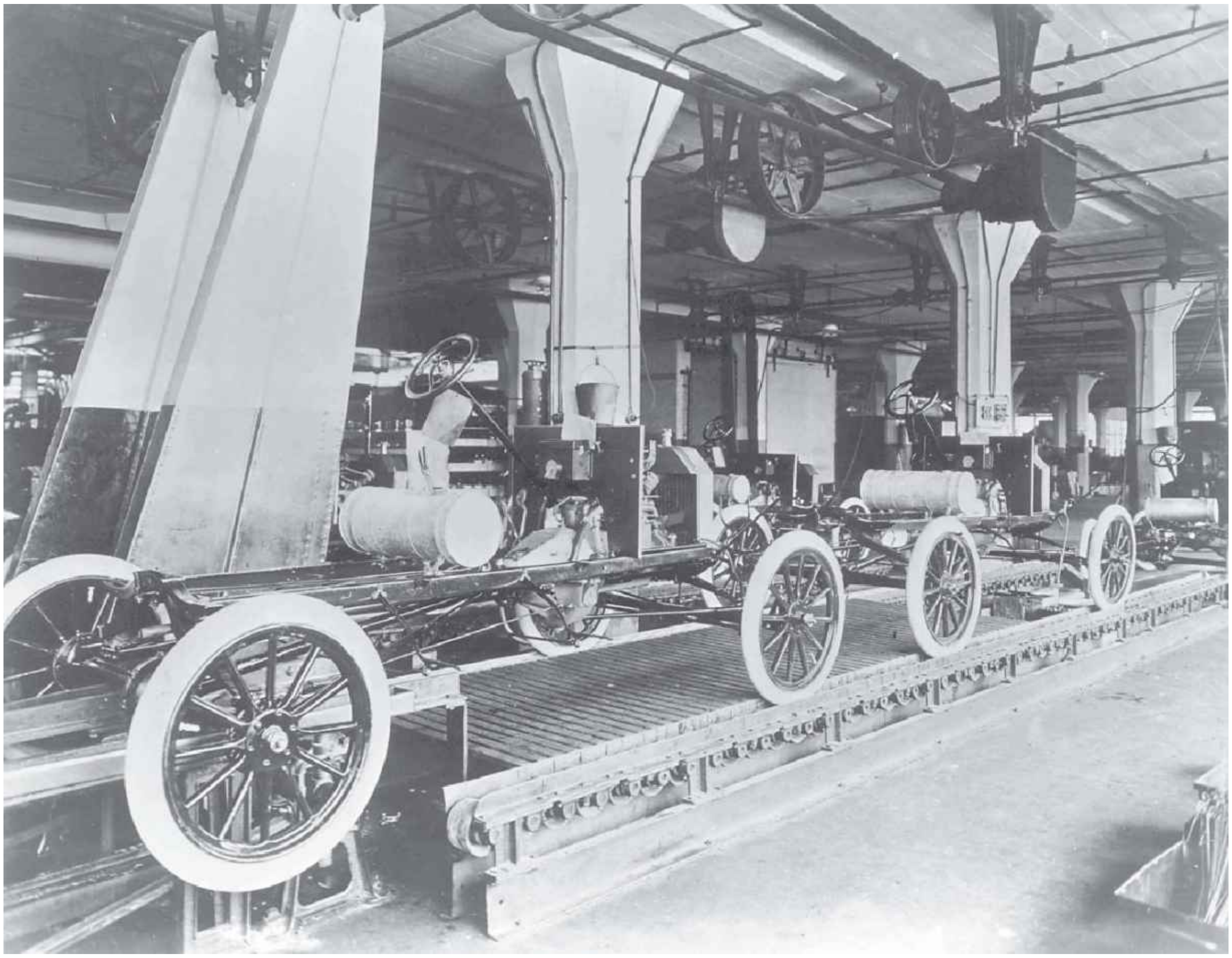
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[1]Bourgeois et al.1996□□□□□□□□20□□50□□□□□Ghent□□□□□□□□□□□□□□□□□□□

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[3]□□□□□□□□Santiago 1997 and 1998□

[4]Melosi 1985□151-2.

[5]Santiago 1997□□□□□□□1924□□□□

[6]Santiago 1998□182□□□□□□Plutarco Elías Calles□□□□□□□1921□□□□

[7]Melosi 1985□97.

[8]Vitale 1983□95□□□□□□□Etemad and Luciani 1991□

[9]1948□□□□□□□□□□Tatarstan□□□□□□□□□60□□□□□□□□□□□□□□□□□□□□□□□□□□1961□□□□□□□□□□□□□Dienes and Shabad 1979□50–61□□

[10]Salau 1996□257–8□□“□□”□□□□□1976—1988□□□□□□□□□□□□□200□□□□□□□□□□□

[11]□□□□□□□□Lowman and Gardner 1996□Osaghae 1995□

[12]□□□□□□□Holdren 1991□124□□□□□Buxton 1993□Earle 1995□261—91□Gorman 1993□119□□ReVelle and ReVelle 1992□408–11□

[13]Burger 1997□□□□□□□□□□□□

[14]1992□□□□□□□□□UNDP□□□□□□□□□□10□□□□□□□□□10□□□□150□□□□□□□□□□□25 April 1992□48□□□□

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[16]□□□□□□□Pfister’s□1995□□

[17]Silversides 1997□1□□□□

[18]Ibid.□□□□□□□□□Silversides 1997□107□□□□□□□□□□□□□□□·□□□□□Armst Kurelek□□

[19]□□Ausubel 1989□□□□□□□□□□□□□□□□□Grübler and Nakičenovič 1991□□□□□□□□□□□□□

[20]□□□□□□□Grübler and Nakičenovič 1991□56–7□□□Lay 1992□131–3□1900□□□□10□□□□□□□□□□□4□□□□□

[21]□□□□□□□□□Tucker□□□□□□□□□□□□□□□□□Dean 1987□□□□□□□□□□□□·□□□□□□□□□□·□□□□□Daniel Ludwig□□□□□□□□□□□□□□

[22]□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Freund and Martin 1993□

[23]□□□□□□□□□□□Freund and Martin 1993□Jackson 1985□157–71,246–71□Kay 1997□□□Melosi 1985□105–12□□□□□□□□1925□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1985□□□1925□□□10□□□□□□□15□□□□□□□□Lay 1992□176□

[24]Berkhout 1994□324□□94%□□□□□□□□□□□□□

[25]The Economist□28 March 1998□63.

[26]Savchenko 1995□2□□□□□□□□□□□□□□□□1.4□□45.5□□□□□□□□□□pp.78–84□□□□□1990□□□□□□□□□□□□pp.128–30□□□□□□□□□□□□□□□□□□□□□□64□□□□□□□□□□□□□□□□□□□□□2/3□□□□□□p.142□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Nuclear Energy Agency□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1986□□□□□□□□□□□□□□□□□□□□□□□□1995□□□□□□□□□□Shchebrak 1996□□□□□□□□□□□□□□□10□□□3.2□□□□□Eisler 1995□□□□□□□□□□□□□□

[27]Grübler 1994□44.

[28]Ayres 1989□□□□20□□80□□□□□□□□□□□□□□□□□10□□□□□□□□□□94%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□25□□□□

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[30] □ □ □ □ □ □ □ □ Ausubel 1989,1996□Grübler 1994□Herman et al.1989 □ □ Nakicenovic 1996 □ □ □ □ □ Adams 1995 □ Schurr 1984 □ □ □ □ □ □ □ □ □ □ Dessus and Pharabod 1990□292□Grübler 1994□□□Smil 1994□205–7□Reddy and Goldemberg 1991□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Wernick et al.1996□

[31]Adams 1995□187–8□□□□□□□□□1914□□□□□□□□□□□50□□□□□□□□□□□□□□□□□□□□□□□□□Pfister 1995□

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[33]□□□□□□□□□□□□□□□□□□□1955□□□□20□□80□□□□□□□□□□

[34]□□□□□□□http□//www.mamba.bio.uci.edu□1997□10□2□□□□□□□□□□□□□University of California-Irvine□□□□·J.□□□□□Peter J.Bryant□□□□

[35]□□□□□□□□□□□□□·□□□□□□□□□□□□□□□□Augelli 1989□□□□□□□□□Dean 1995□McNeill 1988□□□□□□□□□□□□□□□□□□□□□□□□□□□Amanor 1994□□□□□□□□Dourojeanni 1989□□□□□□□McNeill 1992b□□□□□□□□□□□□maquiladoras□□□□Nuccio and Ornelas 1987□□□□□□Mander and Goldsmith□1996□□□□□□□□□□□□

[36]□□□□□□□□□□□□□□□□□□Berkes 1992□Ostrom 1992□

[37]□□□□□□□□□□□□□□□Polonoroeste□□□□□□□□□□□□□□□□□□Carajás□□□□□□□□□□□□□□□□Sing rau li□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□5□□□□□□□Wade 1997□□Rich 1994□□□□Bayalama 1992□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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——[illegible]·[illegible]Francis Bacon[illegible]*Novum Organum*,1620[illegible]

[illegible]

——[illegible]·[illegible]*African Queen*,1951[illegible]·[illegible]

20[illegible]20[illegible]60[illegible]20[illegible]

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[illegible]1970[illegible]1970[illegible]

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[illegible]“[illegible]”[illegible]technological lockin[illegible]19[illegible]

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[illegible]20[illegible]

[illegible]1880[illegible]1926[illegible]“[illegible]”[7][illegible]“[illegible]”[illegible][8][illegible]·[illegible]Heinrich Himmler[illegible]SS[illegible][9]

[illegible]1917[illegible]Social Credit[illegible]D.H.Lawrence[illegible]·[illegible]Knut Hamsun[illegible][10][illegible][11]

[illegible]1957[illegible]

[illegible]viscose fiber[illegible]Khrushchev thaw[illegible]——[illegible]——[illegible]1966—1967[illegible]20[illegible]50[illegible][12]

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[illegible]1930[illegible]1868—1945[illegible]1945[illegible]

[illegible]“[illegible]”[illegible]

[illegible]pronatalism[illegible]20[illegible]1871[illegible]·[illegible]Nicolae Ceauşescu[illegible]1918—1989[illegible]1965[illegible]2000[illegible]3000[illegible]4:1[illegible]1966[illegible]

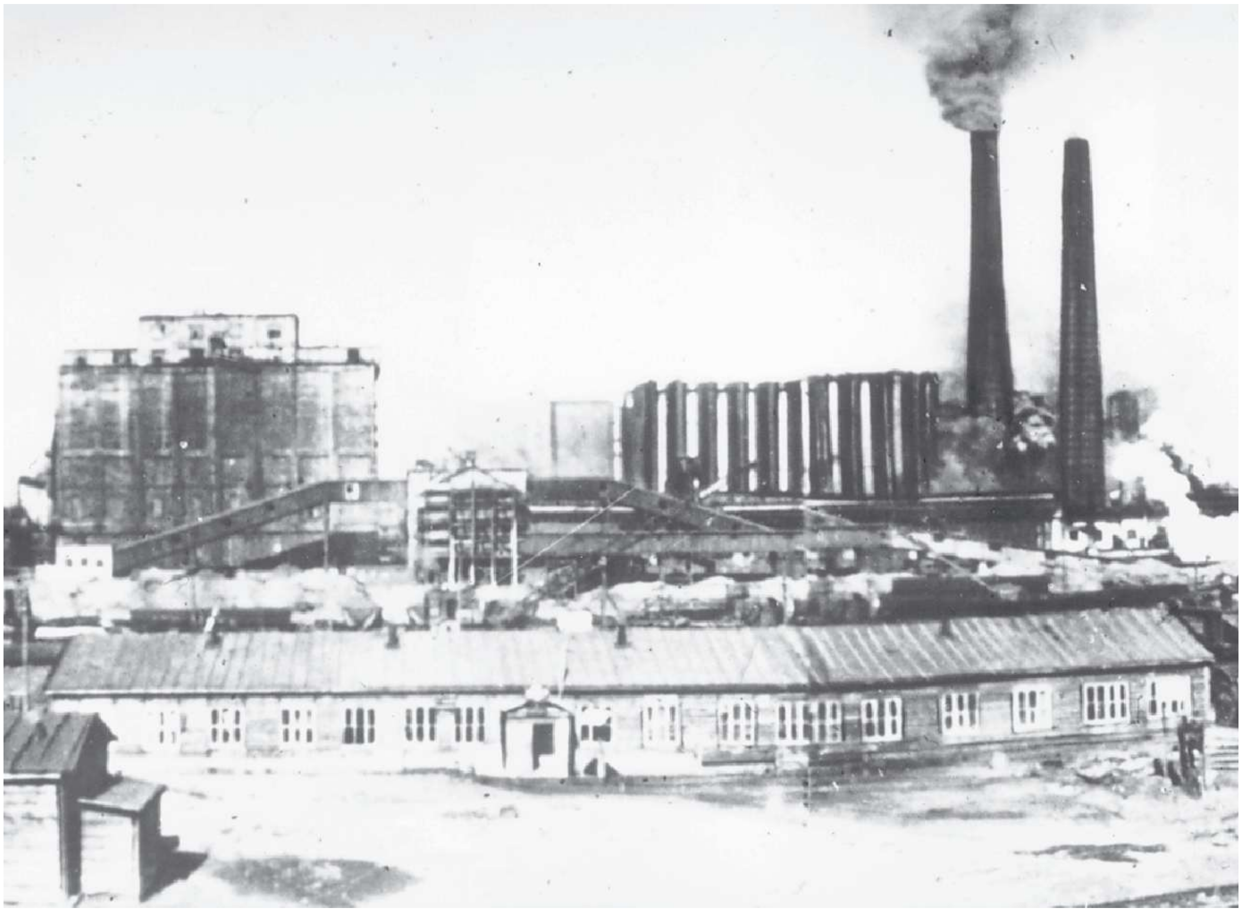
[illegible][14][illegible]1979[illegible]1971—2000[illegible][15]

[illegible]——[illegible]——[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]1926[illegible]V.Zazurbin[illegible]

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1931[illegible]M.N.Pokrovsky[illegible]“[illegible]”[illegible][16]



[illegible]Urals[illegible]20[illegible]30[illegible]

[illegible]Magnitogorsk[illegible]1929—1933[illegible][17][illegible][18][illegible]“[illegible]”[illegible][19]

[illegible]1990[illegible]open-hearth[illegible]19[illegible]

[illegible]20[illegible]

[illegible]20[illegible]30[illegible]



[illegible]1955[illegible]Krasnodar[illegible]Lenin Collective[illegible]Kuban Cossacks[illegible]20[illegible]20[illegible]30[illegible]

[illegible]1945[illegible]

[illegible]1935—1970[illegible]

[illegible]·[illegible]Reverend Thomas Malthus[illegible]1766—1834[illegible]W.S.Jevons[illegible]1835—1882[illegible]

[illegible]1935—1960[illegible]
[illegible]
[illegible]1984[illegible]70[illegible]
[illegible]“[illegible]”[illegible]
[illegible][20][illegible]
[illegible]1880[illegible]

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[illegible]20[illegible]

[illegible]1880—1970[illegible]
[illegible]
[illegible]energy flow[illegible]

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[illegible]20[illegible]1970[illegible]·[illegible]
[illegible]Aldo Leopold[illegible]1887—1948[illegible]
[illegible]biogeochemical flow[illegible][22][illegible]
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[illegible]1910[illegible]
[illegible]1870[illegible]
[illegible]

[illegible][23][illegible]20[illegible]60[illegible]

20[illegible]60[illegible]1945—1973[illegible][24]




1962[illegible]·[illegible]1962—1963[illegible]1963[illegible]

[illegible]·[illegible]Rachel Carson[illegible]1907—1964[illegible]1962[illegible]*Silent Spring*[illegible]the Borgias[illegible]1963[illegible]——[illegible]DDT[illegible]——[illegible][25]

[illegible][26][illegible]1970[illegible]Earth Day[illegible]2000[illegible]20[illegible]80[illegible]1990[illegible]140[illegible]2[illegible][27][illegible]Greek Orthodox Patriarch[illegible][28][illegible]Big science[illegible]1971[illegible]“[illegible]”[illegible]Man and the Biosphere[illegible]1990[illegible]1998[illegible][29]

[illegible]1960—1990[illegible]20[illegible]80[illegible]“[illegible]”[illegible]——[illegible]——[illegible]1973[illegible]80[illegible]

[illegible]

[illegible]1997[illegible][30][illegible]

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[illegible]1970[illegible]

[illegible]20[illegible]1910—1991[illegible]1945—1991[illegible]1945[illegible]

[illegible]1870[illegible]1914[illegible]autobahns[illegible]1921[illegible][32]

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[illegible]9[illegible]7[illegible]/[illegible]

[illegible]3000[illegible]1000[illegible]Hanford Engineering Works[illegible]50[illegible]1949[illegible]“[illegible]”[illegible]green uranium[illegible]20[illegible]“[illegible]”[illegible]Green Run[illegible]8000[illegible]—131[illegible]80[illegible]1000[illegible]1986[illegible][33]

[illegible]75[illegible]1000[illegible]10000[illegible][34]

[illegible]command economy[illegible]4.5[illegible]1949—1991[illegible]715[illegible]Semipalatinsk[illegible]Novaya Zemlya[illegible]1972[illegible]1984[illegible]Archangel[illegible]Northern Fleet[illegible]

[illegible]Mayak[illegible]26[illegible]50[illegible]1948—1956[illegible]

[illegible]Techa River[illegible]1952[illegible]1957[illegible]2000[illegible]40%[illegible]1958[illegible]Lake Karachay[illegible]1967[illegible]3000[illegible]50[illegible]20[illegible]80[illegible]600[illegible]roentgen[illegible]Supreme Soviet’s Subcommittee on Nuclear Safety[illegible]·[illegible]Alexander Penyagin[illegible]100[illegible][35]

[illegible][36][illegible]1940[illegible]1/10[illegible][37][illegible]

[illegible]20[illegible]1944—1945[illegible]10[illegible]20[illegible]2000[illegible]1965—1973[illegible][38][illegible]1937—1945[illegible]1938[illegible]11[illegible]4000[illegible]Gallipoli[illegible]1991[illegible]

[illegible][39]

[illegible]20[illegible]proxy war[illegible]

20[illegible]·[illegible]·[illegible]William Tecumseh Sherman[illegible]1820—1891[illegible]1921—1926[illegible]the Berbers[illegible]napalm[illegible]1944—1949[illegible]20[illegible]50[illegible]Agent Orange[illegible]1979[illegible][40]

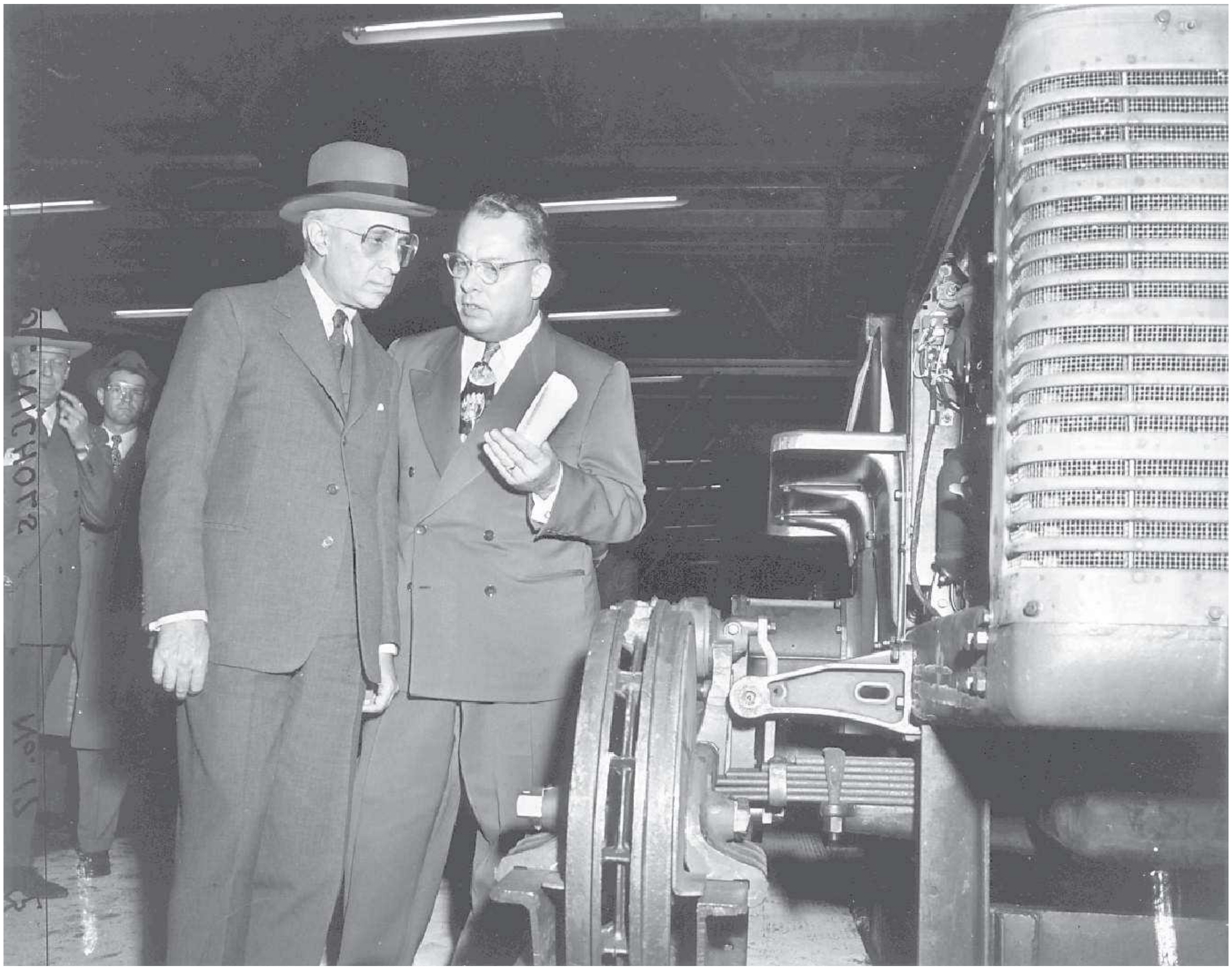
[illegible]Veneto[illegible]80[illegible]“[illegible]”[illegible]600[illegible]20[illegible]30[illegible]Liberty ships[illegible]11[illegible]20[illegible]30[illegible][41]

[illegible] 20 [illegible] 90 [illegible][42] [illegible]

[illegible] 20 [illegible] sisal [illegible] 20 [illegible] 40 [illegible] Tanganyika [illegible][43]

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[illegible] 20 [illegible] 70 [illegible] 80 [illegible] 90 [illegible][44]



[illegible]1947[illegible]1949[illegible]International Harvester Company[illegible]R.H.Reishus[illegible]

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[illegible]1981—1984[illegible][48][illegible]1983[illegible]1998[illegible]（corporatist[illegible]（consensual politics[illegible]1989[illegible]（agribusiness[illegible][49]



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[illegible]20[illegible]60[illegible]“[illegible]”[illegible][50]

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[illegible]20[illegible]80[illegible]1992[illegible]U.N.Conference on Environment and Development[illegible]“[illegible]”[illegible]20[illegible]1992[illegible]1999[illegible]

[illegible]1970[illegible]1985[illegible]

[illegible][51][illegible][52]20[illegible]60[illegible]“[illegible]”[illegible]20[illegible]80[illegible][53][illegible]20[illegible]70[illegible]“[illegible]”[illegible]villagization[illegible][54][illegible][55]

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[2][illegible]·[illegible]9[illegible]1–3[illegible]“[illegible]”[illegible]31[illegible]20[illegible]“[illegible]”[illegible]

[3]White 1967[illegible]Tuan 1968[illegible]Asquith and Kalland 1997[illegible]Bruun and Kalland 1995[illegible]Hou 1997[illegible]Livingstone 1994[illegible]Toynbee 1972[illegible]Zaidi 1981[illegible]

[4][illegible]Ehrenfeld 1978[illegible]Merchant 1980[illegible]Opie 1987[illegible]

[5][illegible]1850[illegible]

[6][illegible]Prager 1993[illegible]61–2[illegible]

[7][illegible]Patrick Abercrombie[illegible]Buller 1992[illegible]70[illegible]

[8]Walter 1989.

[9]Gröning and Wolschke-Bulmahn 1987a,1987b,1991[illegible]·[illegible]Daniel Inkelas[illegible]Nolte 1966[illegible]419–20[illegible]Rollins 1997[illegible]

[10]Kizaki 1938.

[11][illegible]1922—1943[illegible]1/3[illegible]McNeill 1992b[illegible]337–8[illegible]·[illegible]General Ioannis Metaxas[illegible]1939[illegible]Metaxas 1969,2[illegible]214–9[illegible]Salazar[illegible]Brouwer 1995[illegible]Iron Guard[illegible]“[illegible]”[illegible]Bramwell 1989[illegible]162[illegible]

[12][illegible]Weiner 1988 and 1999[illegible]355–73[illegible]

[13][illegible]Shiva 1991a[illegible]17[illegible]Guha and Martinez-Alier 1997[illegible]156[illegible]8[illegible]

[14]Chesnais 1995[illegible]171–73,177–8[illegible]

[15][illegible]Ipsen 1996[illegible]Quine 1996[illegible]

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[17]Andreev-Khomiakov 1997□29–38.

[18]Oschlies 1985□□□□□□□□□□□□□□□□□□□□Ordos 1991□Jele.ek 1988,1991□□□□□□□□□□Stebelsky 1989□□□□□□□□

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[20]1974□□□□□□□□□□□□□·□□□Robert Solow□□□Rees 1992□123□□□□□□□□□□□□□□□□□□□·□□□Julia Simon□□□Dryzek 1997□48□□□□

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[25]Lear 1997□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Admiral Mahan□□□□□□□□□□□□□□□□□□□□□□□□□□

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[27]□□□□·□□□Marvin Gaye□□□□·□□□□Joni Mitchell□□□□□□□□□□□□□□□□Alabama□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

[28]□□□□□□□□□Oliver 1992□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□The Economist,21 December 1996□108–9□□□□□□□□□□□□□□□□□□□□□

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[31]□□·□□□Luc Ferry□□□□□□□□1995□□□□□□□□□□□□deep ecology□□□□□□□□□□□□□□□□□□□□□□□□□□300□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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[33]Gerber 1992.

[34]Fioravanti and Makhijani 1997□USDOE 1995.

[35]Cochrane et al.1993□Nilsen and Bohmer 1994□Nilsen and Hauge 1992□Yablokov 1995□Holloway 1994□□□□□1956□□□□□□□□□□□□□□□□□

[36]□□Danielsson 1990□□□□□□□□□□□□□□Makhijani et al.1995□□□□□□□□

[37]Smil 1994□185.

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[39]Clout 1996□Sobolev 1947□Westing 1990□□□□□□□□□□□□□□□1994□□□□□□□□□□□□□□□□Burger 1997□69–73□Hawley 1992□Hobbs and Radke 1992□Aarsten 1946□□□□17%□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ElShobosky and Al-Saedi 1993□□□□□□□□□□□□1941—1943□□□□□□1991□□□□□□□□□□□□□□□□□□desert crust□□□□□□□□□□□□□□

[40]Demorlaine 1919□McNeill 1992b□260–70□Prochaska 1986□Westing 1990.

[41]Celi 1991□□□□□□Opie 1993□96□□□□□□□□□□□Kuusela 1994□125□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□The Economist,17 June 1995□35□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□20□□80□□□□□□□□□□300□□□□□□□□□□□□□□□Azhar 1985□Allan 1987□□

[42]Westing 1980□154□□□□□□□□□□□Turner et al.1990□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□Environment 35□4□□22□□□□□□□□□□□□□□□□

[43]Adams 1992□104□Hogendorn and Scott 1981.

[44]□□□□□□□□□□□Jänicke and Weidner 1996□Lafferty and Meadowcroft 1996□

[45]□1689—1725□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□1762—1796□□□□□Massey 1992□16–17□

[46]Dorsey 1998.

[47]Gadgil and Guha 1995□Guha 1990□Guha and Martinez Alier 1997.

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[49]□□□□1970—1995□□□□□□□□□□□□Bührs and Bartlett 1994□Broadbent 1998□Cramer 1989□Dalton 1994□de Jongh and Captain 1999□Dede 1993,Diani 1995□Hays 1997□Lee and So 1999□Rothman 1998□Stevis 1993□Villalba 1997□□Votruba 1993□

[50]□□□□□□□Tolba and El-Kholy 1992□737–98□□Young 1997□□□□□□□□□□□□□□□□Bibliography under WCED 1987□□□□□□□□□□□□·□□□·□□□□□Gro Harlem Brundtland□□□□□

[51]OECD 1998.

[52]Humphrey and Sneath 1996,vol.1.

[53]Lee and Feng 1999.

[54]Shao 1986□□□□□□□□□□□□□□□□□□1969—1975□□□□□□□□80%□□□□□□□□□□□□□□□□□·□□□Julius Nyerere□“□□□□□□”□□□□□□□□□

[55]□□□□□□□□□□□Dryzek 1997□Jänicke and Weidner 1996□Karan 1994□McCormick 1991□Mandrillon 1991□Panjari 1997□Price 1994□□Tolba and El-Kholy 1992□

# [illegible]

[illegible]

——[illegible]Machiavelli[illegible]*The Prince*[illegible]1513[illegible]

1930[illegible]·[illegible]Robert Millikan[illegible]1868—1953[illegible][1][illegible]·[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible][2][illegible]

[illegible]

[illegible]——[illegible]——[illegible]

[illegible]ecological crunch[illegible]1960[illegible]20[illegible]90[illegible]1960[illegible]

[illegible][3][illegible]

[illegible]20[illegible]11.1[illegible]20[illegible]1900[illegible]1900[illegible]

[illegible]11.1 [illegible]20[illegible]

| 项目 | 19 世纪 90 年代—20 世纪 90 年代增长率 |
| --- | --- |
| 全球人口 | 4 |
| 城市占全球人口比 | 3 |
| 全球城市人口 | 13 |
| 全球经济 | 14 |
| 工业产出 | 40 |
| 使用能源量 | 13 |
| 煤炭产量 | 7 |
| 空气污染 | ≈ 5 |
| 二氧化碳排放 | 17 |
| 二氧化硫排放 | 13 |
| 排放至大气圈的铅量 | ≈ 8 |
| 使用水量 | 9 |
| 海洋渔获量 | 35 |
| 牛群数量 | 4 |
| 猪群数量 | 9 |
| 马匹数量 | 1.1 |
| 蓝鲸数量（限南冰洋） | 0.0025（减少 99.75%） |
| 长须鲸数量 | 0.03（减少 97%） |
| 鸟类与哺乳类物种 | 0.99（减少 1%） |
| 灌溉面积 | 5 |
| 森林面积 | 0.8（减少 20%） |
| 耕地 | 2 |

[1]Hobsbawm 1994，534。

[2]Elvin 1993□

[3]McGovern 1994□□□□□□□□□□□□15□□□□□□□□□□□10□12□□□□□□□□□□□□□□□□□□□□□□□□enclave□□□□□□□Little Ice Age□□□□□□□□□□□□□□□□□□□□□□□Inuit□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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